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ABSTRACT

The conferences generated comprehensive updates of changes in the CRCM database-monitoring system and described some successful CRCM programs that are based on using the database. The CRCM activity is a comprehensive approach that enables eligible organizations to institute systemic change to address issues of precollege minority achievement in science, mathematics, engineering, and technology. The Eastern and Western conferences, with approximately 40 and 38 participants, respectively, highlighted effective strategies and models. Agendas from both conferences are included. Each included an overview of the purposes and history of the database, and each discussed the minimum obligatory set (MOS). Both conferences discussed future directions for the database. Each conference presented CRCM working papers from participant universities and colleges. (SLD)

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ED376253

NATIONAL SCIENCE FOUNDATION

Comprehensive Regional Centers for Minorities Proceedings

EASTERN WESTERN $\sum_{n=3}^{10}$ REGIONAL CONFERENCES "THE DATABASE MONITORING SYSTEM: MAKING IT WORK"

October [illegible] 1993
Baltimore, Maryland

October 9, 10, 1993
El Paso, Texas

Division of Human Resource Development
Directorate for Education and Human Resources

UD030163

GREETINGS

From the Assistant Director
Directorate for Education and Human Resources

As we approach the twenty-first century, economic and demographic trends require that greater attention be given to the needs of students at risk and the country's increasing need that these young people become skilled participants in the work force. As students who have been traditionally at risk—poor children and children of color—are growing in number, the status of this country's economic competitiveness in a global economy becomes problematic.

Many public school districts are characterized by student enrollments drawn largely from economically disadvantaged youths and students of color, and current economic trends and demographic indices are fueling a new sense of urgency to mathematics and science education reform. Given this framework, the question must be asked, "Why have we endured for so long, even decades, the personal and social costs of school failure by our students, particularly in science and mathematics?" The National Science Foundation's (NSF) newly emerging programming activities are breaking rank with the status quo by giving these students opportunities to achieve educational excellence.

The NSF is seeking to create a nontraditional cadre of professional problem solvers who have the knowledge, capacity, and courage to formulate effective and competent mathematics and science education programs that focus on students not served well by the current system. In addition, these same persons must be able to evaluate the impact of their efforts on enhancing the overall academic performance of these students, both in the short term and long term. The database activities described in this booklet highlight the efforts of one of our systemic programs in the Directorate for Education and Human Resources to meet this challenge.

LUTHER S. WILLIAMS

From the Division Director
Division of Human Resource Development

It is clear that our system of education and the quality of the nation's work force are more closely linked now than perhaps at any other time in our history. Historically, the principal base of our economy has changed from agriculture to manufacturing and is now rapidly becoming technology based. It is projected that by the year 2000, nearly 80 percent of new entrants into the work force will be women, minorities, and recent immigrants. It is within this context that the readiness of this work force is of utmost concern to the science and engineering educators and researchers. Our economy will require individuals with skills that are rooted in the knowledge of science, mathematics, engineering, and technology (SMET). Not only must we motivate our young students to consider careers in SMET disciplines, we must also insist that they maintain excellence in every aspect of their training and related performance. To achieve this, in my opinion, every individual, whether at the local, regional, or national level, must embrace new methods of education. New paradigms are necessary for us to depart from the status quo. In establishing these paradigms, we must reassess our educational and research policies with respect to our instructional work force.

The task will not be easy. We must provide a legacy of our willingness to remedy the identified problems in the way we conduct education and research. This legacy must demonstrate that we worked with courage, dedication, and expertise to reform our practices and remove the barriers to our success in the competitive arena. The topics highlighted in this publication include: emphasis on academic excellence; strong parental involvement; committed teachers; public and private sector interaction; student research experiences; and other student-focused enrichment activities. These areas are vital to the reform of our nation's educational system.

Finally, several of the successful Comprehensive Regional Centers for Minorities described in this publication served as precursors to many of the newly established Urban Systemic Initiatives.

ROOSEVELT CALBERT

NATIONAL SCIENCE FOUNDATION

Comprehensive Regional Centers for Minorities Proceedings

EASTERN WESTERN $\sum_{n=3}^{10}$ REGIONAL CONFERENCES "THE DATABASE MONITORING SYSTEM: MAKING IT WORK"

October 2–3, 1993
Baltimore, Maryland

October 9–10, 1993
El Paso, Texas

Division of Human Resource Development
Directorate for Education and Human Resources

ACKNOWLEDGMENTS

The idea for this project was originated by Dr. Roosevelt Calbert, Division Director of Human Resource Development. This project was coordinated by Dr. Betty Ruth Jones, Program Director for Career Access, Division of Human Resource Development. This proceedings was edited by Dr. Calbert, Dr. Jones, Dr. Costello Leon Brown, Program Director, Career Access of the National Science Foundation; Dr. Lloyd Richardson, Technical Consultant, University of Missouri, St. Louis, Missouri; and National BioSystems, Incorporated, Rockville, Maryland. We wish to extend a very special thanks to the Eastern and Western Regional Conference participants. We are grateful to Morgan State University, Baltimore, Maryland and the University of Texas at El Paso and their Presidents for serving as host for the conferences. In addition, we are pleased to acknowledge the work of Ms. Rachel Delgado-Simmons for the cover design, Mr. Rizalino Jacob for photographic designs and Ms. Patricia Bryant and Ms. Patricia Hughes of the National Science Foundation for the printing of this document. Acknowledgments are extended to GUILD, Incorporated, Hyattsville, Maryland for overall graphic concepts and designs.

INQUIRIES

Questions not addressed in this publication may be directed to the HRD staff by writing to:

Division of Human Resource Development
Directorate for Education and Human Resources
National Science Foundation
Room 815
4201 Wilson Boulevard
Arlington, VA 22230

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This document is a summary of two regional conferences supported by the National Science Foundation. Any opinions, conclusions, or recommendations expressed do not reflect the views of the National Science Foundation.

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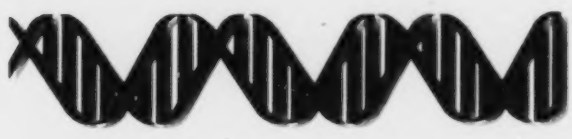

FOREWORD

The National Science Foundation's (NSF) Directorate for Education and Human Resources (EHR) and Division of Human Resource Development (HRD) sponsored Eastern and Western Regional Conferences on "The Database Monitoring System: Making it Work." The Eastern Regional Conference was hosted by the Comprehensive Regional Center for Minorities (CRCM) at Morgan State University, October 2–3, 1993, at the Omni Inner Harbor Hotel, Baltimore, Maryland. The Western Regional Conference was hosted by the CRCM at the University of Texas at El Paso on campus and at the Camino Real Paso del Norte Hotel, El Paso, Texas, October 9–10, 1993.

The overall purpose of the working conferences was to provide a comprehensive update of new and revised changes in the CRCM database monitoring system. In addition, CRCM project directors made presentations on one of their most successful CRCM programs based on utilization of the database system.

The NSF CRCM project, which was established in 1988, is one of three activities under the Career Access Program. The CRCM activity is a comprehensive approach that enables eligible organizations, in collaboration with school districts with substantial minority student enrollments, to bring about systemic changes that will address issues of precollege minority student achievement in Science, Mathematics, Engineering, and Technology (SMET).

In 1990, EHR initiated the development of a database monitoring system with a correlated set of data elements common to all Centers. The CRCMs established a Task Force on Evaluation with designated Center representatives. The strategic project objectives and goals of each unique Center warranted the need for the development of a unified database with primary elements compatible and consistent for the transfer of program, teacher, and student data.

Numerous meetings were implemented periodically to address pilot initiatives, retool, redefine, reshape, and amplify the database monitoring system for respective Centers. The meeting sites were Washington, D.C.; Atlanta, Georgia; Rio Piedras, Puerto Rico; Phoenix, Arizona; St. Louis, Missouri; Los Angeles, California; and Chicago, Illinois. Quantitative and qualitative data elements were assessed, thereby resulting in a refined set of data. This data was identified as being a "minimum set" that respective Centers collected and provided to the HRD Division. This database monitoring system is known as the Minimum Obligatory Set (MOS). An abbreviated sample of the MOS can be found in the appendix of this proceedings.

The Eastern Regional conference was composed of approximately 40 persons including NSF staff. The States represented by eight of the CRCM projects were Pennsylvania (Philadelphia), Florida (Tallahassee), Missouri (St. Louis), Ohio (Cincinnati), Mississippi (Jackson), Illinois (Chicago), Massachusetts (Boston), and Maryland (Baltimore). Special guests included the Mayor of Baltimore, the Honorable Kurt Schmoke; the Superintendent of Baltimore City Public Schools, Dr. Walter Amprey; the President of Morgan State University, Dr. Earl Richardson; the Deputy Superintendent of Institutional Programs of the Baltimore City Public Schools, Dr. Lillian Gonzalez; and the Assistant Superintendent of Curriculum and Instruction, Dr. Maurice Howard.

The Western Regional Conference consisted of approximately 38 persons including NSF staff and featured CRCM projects from the following six states: California (Los Angeles), New Mexico (Las Vegas), Phoenix (Arizona), Texas (San Antonio), Montana (Bozeman), and Texas (El Paso). The program format was similar to the Eastern Regional Conference in Baltimore and included the President of the University of Texas at El Paso, Dr. Diana Natalicio. An agenda for each conference is included in these proceedings.

The overall purpose of the working conferences was to provide a comprehensive update of new and revised changes in the CRCM database monitoring system. In addition, CRCM project directors made presentations on one of their most successful CRCM programs based on utilization of the database system.

The Eastern and Western Regional Conferences brought together CRCM project directors and their data analysts and/or evaluators in a specified region with expert invited plenary speakers and technical database specialists along with NSF staff, the Division Director of HRD, and the Assistant Director of the EHR Directorate.

The conferences were significant because they highlighted effective strategies and models on the utilization of the database

monitoring system that may be useful in addressing the need for measurable improvement in the preparation of minority precollege students in science, engineering, and mathematics. Based on regional comprehensive and systemic changes or reform occurring as a result of some of the CRCMs, this report provides the following: (1) a mechanism for exemplifying precollege systemic change or reform; (2) a mechanism for exemplifying precollege database dynamics; (3) a mechanism for CRCMs to share effective strategies and models of successful student-focused activities and interventions; (4) an established mechanism for defining standards for exemplary program outcomes; (5) a resource book and communications vehicle for linking CRCMs with other programs; (6) an opportunity for CRCMs to share, exchange, and contribute knowledge gained from effective strategies and outcomes; and (7) a mechanism for adoption and institutionalization of effective strategies by precollege educational establishments to implement systemic change or reform.

We hope these proceedings will become a resource guide to a broad-based audience of educators, policymakers, communities, corporations, industries, and activists who are working to increase access to careers in SMET for members of underrepresented groups.

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Betty Ruth Jones
Costello Leon Brown
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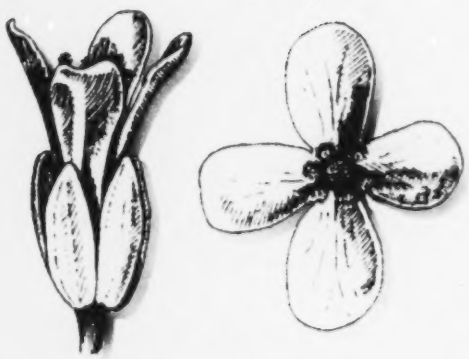


EASTERN REGIONAL CONFERENCE

NATIONAL SCIENCE FOUNDATION

Comprehensive Regional Centers
for Minorities
(CRCMs)

Eastern Regional Conference

THE DATABASE MONITORING SYSTEM: MAKING IT WORK

Host: Morgan State University

October 2–3, 1993

SEMPREP Program
(Science, Engineering, Mathematics Precollege Preparation)

Participating CRCMs:

- Florida A&M University
- Jackson State University
- Loyola University of Chicago
- Northeastern University
- PATHS/PRISM for the Greater Philadelphia Region
- University of Cincinnati
- University of Missouri at St. Louis
- Morgan State University

Saturday, October 2, 1993 — PLENARY SESSION I

8:00 – 8:30 a.m.
Registration and Continental Breakfast

8:30 – 9:00 a.m.
Opening Plenary Session

Presiding Speaker

Dr. Eugene M. DeLoatch
Dean, School of Engineering,
Morgan State University
CRCM Principal Investigator

Greetings and Welcome

Dr. Earl Richardson
President, Morgan State University

Dr. Lillian Gonzalez
Deputy Superintendent
Baltimore City Public Schools

Introduction of Conferees and National Science Foundation Officials

Dr. Betty Ruth Jones
CRCM Program Director
National Science Foundation

Dr. Costello Brown
CRCM Program Director
National Science Foundation

Opening Plenary Session Remarks

Dr. Luther S. Williams
Assistant Director, Education and Human Resources
National Science Foundation

Dr. Roosevelt Calbert
Division Director,
Human Resource Development
National Science Foundation

9:00 – 9:15 a.m.
Purpose, Historical Perspectives, and Database Update

Dr. Costello Brown
Dr. Betty Ruth Jones

9:15 – 10:00 a.m.
Overview: The Minimum Obligatory Set (MOS) Revisited

Dr. Lloyd Richardson
CRCM Technical Assistant
University of Missouri

Mr. Carlos Reyes
Senior Analyst
Quantum Research Corporation

10:00 – 10:10 a.m.
Coffee Break

10:10 – Noon
Hands-On Working Sessions

Noon – 1:30 p.m.
Luncheon Session

Greetings and Welcome

Dr. Maurice B. Howard
Assistant Superintendent for Curriculum and Instruction
Baltimore City Public Schools

Luncheon Keynote Address

Dr. Luther S. Williams
Assistant Director, Education and Human Resources
National Science Foundation

1:30 – 3:00 p.m.
Working Group Sessions
(continued)

3:00 – 3:10 p.m.
Coffee Break

3:10 – 5:50 p.m.
CRCM Project Presentations

6:00 – 9:00 p.m.
Dinner Session

Greetings and Welcome

Dr. Eugene M. DeLoatch
Dean, School of Engineering
Morgan State University
CRCM Principal Investigator

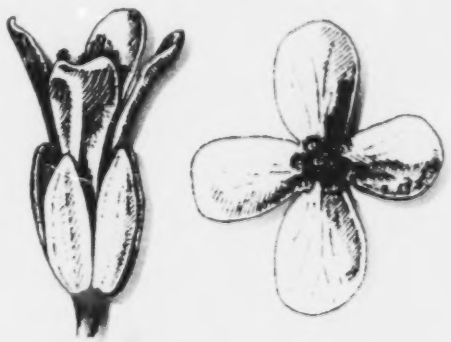
Dr. Jay Carrington Chunn
Associate Vice President for Academic Affairs
Morgan State University

Keynote Address Introduction

Dr. Edmonia Yates
Director of SEMPREP Program

Keynote Address

Dr. Walter G. Amprey
Superintendent
Baltimore City Public Schools



Sunday, October 3, 1993 — PLENARY SESSION II

8:00 – 8:30 a.m.
Continental Breakfast

8:30 – 10:30 a.m.
CRCM Projects
(continued)

Future Directions for the Database Monitoring Systems at the National Science Foundation

10:30 – 11:15 a.m.
Dr. Susan Gross
Dr. Floraline Stevens
Program Directors
Division of Research, Evaluation, and Dissemination
National Science Foundation

11:15 – Noon
Database Working Sessions
(wrap-up)

Noon
Conference Adjourns

Comprehensive Regional Centers for Minorities (CRCMs) Project Presentations

SATURDAY, OCTOBER 2, 1993

3:10 – 3:40 p.m.
Philadelphia CRCM

3:40 – 4:10 p.m.
St. Louis CRCM

4:10 – 4:40 p.m.
Chicago CRCM

4:40 – 5:10 p.m.
Florida A&M CRCM

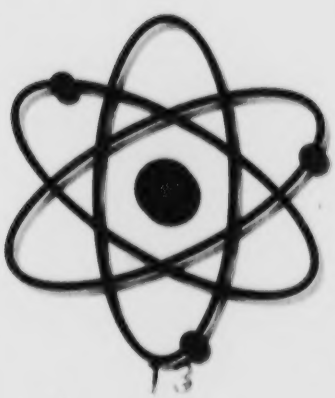
SUNDAY, OCTOBER 3, 1993

8:30 – 9:00 a.m.
Cincinnati CRCM

9:00 – 9:30 a.m.
Jackson State CRCM

9:30 – 10:00 a.m.
Northeastern CRCM

10:00 – 10:30 a.m.
Baltimore CRCM



Eastern Opening Plenary Session

Eastern Opening Plenary Session—Continued

EUGENE M. DELOATCH
Dean, School of Engineering, Morgan State University

Good morning and welcome to Baltimore, Maryland. I am sure I speak for the hotel staff and the staff of the CRCM here at Morgan State University. We are very pleased to have this opportunity to host the Eastern Regional Conference on "The Database Monitoring System: Making It Work."

We have a full program over the next day and a half, and I am extremely excited about this conference. I think we will appreciate this meeting about the general direction of the regional centers and the total package of the Human Resource Development Division of the National Science Foundation.

I have had the opportunity to see higher education and its interface with our partners at the precollege level for over 30 years. In fact, if I include my own high school and college education, next year is my fortieth anniversary.

I am excited about the era that we are in now. Something exciting is happening, and if I have any remorse, it is that some of my own colleagues in higher education do not understand where the action is today. The action is with this particular program and these types of systemic programs in general. The better we can interface with our feeder systems, the sooner the solution will be.

The problem is not with our young people. The problem is our definition of the solution. I am enthused about this development, and I am sure that, when we finish tomorrow, those of us on the front line will be rejuvenated to go back and deal with those lagging behind the curve.

We are delighted to have so much talent with us this morning, especially my boss, Dr. Earl Richardson, President of the University, who will speak later this morning.

Through the cooperative agreement approach, CRCMs do not exist in isolation; instead, they exist in partnership. Here in Baltimore, we are delighted and pleased to have a very strong working relationship with the Baltimore City Public School System. Representing that system this morning is Dr. Lillian Gonzalez, who has been with us from the opening of our center and will also speak this morning.

At this point, I am going to introduce Dr. Earl Richardson, the President of Morgan State University, and we will move through the program from there.

Dr. Richardson.

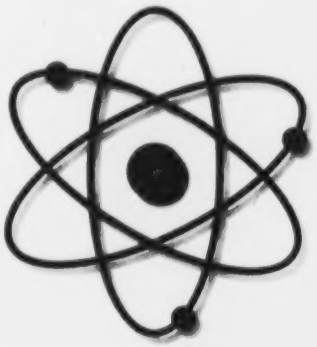
GREETINGS AND WELCOME

DR. EARL RICHARDSON
President, Morgan State University

Thank you, Dean DeLoatch, and thanks to the members of the Eastern Region of the Science, Engineering, and Math Compact. I will not use the term Comprehensive Regional Centers today. I will say the Science, Engineering, and Mathematics Compact. I think that has significance for what we are going to be saying later.

Let me first join Dean DeLoatch in welcoming you to Baltimore, the home of Morgan State University, one of the greatest universities in the country and also the state's designated urban university. By that, we suggest a commitment to the urban region that we believe is fundamental and crucial to our university.

I want to also say welcome to Baltimore, because Baltimore is "The city that reads." I think implicit in the mayor's having designated it as the city that reads, is that Baltimore is also a city that writes, a city that computes, and a city that can also do science, engineering, and mathematics. I think that this is a particularly interesting concept. "The city that reads," and all that the phrase entails, brings together the city, the public



school system, the city as a governmental agency, and the university in partnership. I think the task is of such magnitude that it cannot be done without that partnership that we are talking about; the partnership that creates the pipeline for the students who are going to be our undergraduates in the next decade and beyond.

When you refer to Baltimore as the city that reads, the city that computes, the city that does science, engineering, and mathematics, it also carries with it the concept of the city en masse; not one group, not two groups, not a targeted group, but the entire city. I mean that, if in fact we are to have an impact upon the underrepresentation of minorities in college in general, and in particular on those who are prepared to go into science and engineering, we must direct our efforts so they have a broad-based impact on all of our students in the public system.

Our institutions believe very firmly that our students can learn and that our students can achieve if, in fact, we give them the time, the attention, and the kind of environment that gives rise to learning and achieving. We at Morgan State believe that firmly and have made many efforts in the public school system. We have joined with MESA, various projects in the public school system, and the MUCH Program out of our chemistry department. In the MUCH program, our most talented students go out into the public school system and tutor elementary and secondary school students.

Of course, we have programs growing out of the Comprehensive Regional Center where professors go into schools to teach precalculus and have an impact on science and mathematics. This program is through our center for excellence in mathematics and science. So, much of that is already being done. But I think that the Comprehensive Regional Centers offer a special opportunity because it is a broad-based effort.

Thus far, however, we have been doing things piecemeal. We have a little program here and a little program there, at this school and at that school. What we are talking about now is going across the entire landscape of the public school system in a way that has an impact upon the next generation of young people who come to us as undergraduates, not only in the sciences and engineering, but also across the spectrum. Whether they emerge as teachers, research scientists, accountants, or business executives, we must accomplish what is necessary to have an impact upon the students throughout the pipeline from elementary through the 12th grade, and then into our undergraduate schools.

I think, as Dean DeLoatch has said to you, the challenge for us now is this. Can we, the government, the public school system, the university, and, to some degree, the business community, come together for that single goal? Can we work together? Can we give up our little turf issues and say it is time for us to come together and have an impact upon the curriculum, the preparation of our teachers, and the opportunities of our young people so they are better prepared to enter our colleges and universities in the next decade?

Here in Baltimore we have made the commitment. I have talked to the Mayor. He has told me that he is committed to the partnership between the public school system, Morgan State University, the business community, and, of course, government agencies, not only city agencies, but also state and Federal agencies, such as the National Science Foundation.

I have talked to the Superintendent. As a matter of fact, I talk to him quite often. I talked to him three times this week and will probably talk to him again this afternoon to tell him just how firmly we believe in this Comprehensive Regional Center and what it can do for our jurisdiction and our young people. He, too, has said that he is committed to this partnership and to pursuing it all the way.

We have talked to the business community. While I cannot say that everyone is on board, I think their participation is beginning to ferment. They are beginning to feel this is something we must do and we must do together. I can tell you, when that happens, we are going to see something that emanates from your comprehensive centers such as we have never seen before.

We have some history in this commitment, as those of you from historically black colleges already know. We know what it means when you can give a student a little attention. We know what it means when you can understand the circumstances under which the student labors and when you can tell him or her that he or she is somebody. In fact, if a student feels good about himself or herself and has confidence in his or her ability, he or she can be a success not only in elementary and secondary school but also in undergraduate and graduate school and then in the research labs of this Nation.

We are committed to that, and we are appreciative of the efforts of the National Science Foundation, Dr. Williams. I am getting in the habit of bugging Dr. Williams a lot, too. So, he understands what I mean when I say I have talked to the Superintendent about three or four times this week.

We are very appreciative to the National Science Foundation for providing the funding here. We are very appreciative because when we opened the Comprehensive Regional Center at Morgan, we had the commitment, but commitment is not enough. If you do not have the resources that go with the commitment, commitment is nought.

So, now we have the resources, and the burden is on us. The challenge is whether or not we can work together to make it, indeed, a success. I am convinced that we can. We do not have a choice if, in fact, we are going to have the impact not only in mathematics and science, but also in all the undergraduate fields where minorities are now underrepresented. I would suggest to you that one of the tasks we have before us is making the public at large appreciate two things: one, that this is not an impossible task and two, that it is not just in mathematics, science,

and engineering that we have the underrepresentation.

If you look across the spectrum of higher education today, you are going to find that minorities are underrepresented. If we are looking to the next decade or the next century, if the demographics have said anything to us, we had better stop the rhetoric and begin to act. Then, by the time we are there, we will have the people who will make us competitive in both the educational and economic arenas.

So, I come to you today to suggest that Morgan has that commitment. We are intent upon what we are doing here. I think you will hear that over and often today from the public school system. You are going to hear it from Dr. Amprey this afternoon and from the Mayor, who I understand is going to try to be with you tomorrow morning.

I know you have the same commitment in your jurisdictions. So, I am looking for great things, not only from this conference, but also three or four years down the road, when we have minorities marching forth into our undergraduate schools, majoring in whatever they elect, but particularly science, engineering, and mathematics, and doing well by it.

Thank you so very much.

LILLIAN GONZALEZ
Deputy Superintendent, Baltimore City Public Schools

Good morning everybody. The first thing I do when I walk in when people have asked me to give a speech is to look at the podium and make sure you can see me over the podium. This one worked out just right. Thank you very much.

I am delighted to have been asked to speak. On behalf of the Baltimore City Public Schools, welcome to Baltimore City.

I want to give special thanks to the Comprehensive Regional Center, because they have forged a very meaningful relationship with the Baltimore City Public Schools at a very critical time, when we are going through so much change. I particularly want to give thanks to two people, Dr. Edmonia Yates and Dr. Alice Morgan-Brown, who have been able to set the groundwork for the changes we are experiencing right now. They are with us today. So, thank you very much.

I know many of you have worked with urban school systems. We recognized early on that we alone would be unable to make the changes that we want for the children for the 21st century. So, we want to thank Morgan State and Dr. Earl Richardson for helping us move the school system through the changes that are so critical for the 21st century. We also recognize that we will be unable to prepare our children for the 21st century if we do not begin to focus on mathematics and science.

As Dr. Richardson said, we have had many initiatives throughout the years, but that is not the focus today. Today, we are talking about systemic change. That means we are going to have to be serious about money and resources for the children of Baltimore City.

For too long society in general and schools in particular have been using mathematics and science as a screen to filter out those children who would not be successful. Those of you who took your mathematics and science were successful. Those of us who did not take advanced mathematics and science, well, I guess we were not supposed to be successful. All kidding aside, in the future, our kids will not be successful if they do not take mathematics and science.

Although I cannot tell you what the jobs of the 21st century will be, I can tell you one thing: Future workers will need skills we do not have today. So, we have to move very quickly, because the future is upon us. They are going to need skills so that they can think logically, be able to predict, and think critically. Those are the skills we have to provide our children today.

Some of what we are doing in Baltimore City is raising the expectations. We are asking all our children to learn mathematics and science, not only the bright children. You will hear a lot about that today when Dr. Maurice Howard, our Assistant Superintendent for Curriculum Instruction, greets you.

More importantly, you will hear from Dr. Walter Amprey about changing attitudes—not only that it is not just the smart kid who takes mathematics and science, but that there is no such thing as smart. You are not born smart. Smart is something you will become, and we have to help all our children believe this. More importantly, we have to change the attitudes of our teachers, institutes of higher education, and communities. And Dr. Amprey, who is so good at communicating this thought, will share this with you this evening.

We value the efforts of Morgan and, in particular, we value our special initiative, which is called SEMPREP. We have seen such a difference in our students. I was telling Dr. Yates this morning that I can see it in the eyes and in the attitudes of our children. We have children who have all this energy and enthusiasm about mathematics and science and some of our teachers did not know how to deal with them. Now that they are in SEMPREP, they have learned what to do with this leadership and interest. They really see that their dreams will become a reality.

I thank Morgan, and although I am unable to stay for the entire conference, I hope that you have a very productive one, because we need to learn from you. So, please, give us everything you have. We are open to it.

Thank you very much.

INTRODUCTION OF CONFEREES AND NATIONAL SCIENCE FOUNDATION OFFICIALS

BETTY RUTH JONES
CRCM Program Director
National Science Foundation

To the presiding Dean Eugene DeLoatch, President Richardson, Dr. Gonzalez, and Dr. Yates, I bring you greetings from the National Science Foundation, and good morning to everyone present.

One of the great educators of all times, Dr. Luther S. Williams, Assistant Director of the Directorate for Education and Human Resources (EHR) at the National Science Foundation, in his action plan for the future, had this to say about K–12, undergraduate, and graduate education in science and engineering:

"Our programs must be characterized by a new paradigm of systemic approaches, with emphasis on outcomes" — and I want to emphasize outcomes — "and increased accountability." This is the part that I really like: "It is then the responsibility of the National Science Foundation to maintain the health of science, and it is then the responsibility of the National Science Foundation to maintain the health of mathematics and the health of engineering and the health of research."

Then he went on to say that, "Increased minority participation in the sciences as well as in other disciplines is now understood to be more than just that of equity, but it is essentially important for our future welfare."

I like to think of Dr. Roosevelt Calbert, the Director of Human Resource Development, as the father of minority programs at the National Science Foundation. Dr. Calbert said, "In determining how well our programs are doing, the Foundation has established a Division of Research, Evaluation, and Dissemination to assist other divisions with their efforts to evaluate both programs and projects. We are establishing databases, so that each project will be accountable for meeting its goals and objectives." Dr. Costello Brown will say something else about Dr. Calbert and Dr. Williams when he speaks.

These comments are published in our National Conference Proceedings on Diversity in the Scientific and Technological Workforce, which is coordinated by Dr. Elmima Johnson.

Another distinguished person by the name of Dr. Brown, Program Director, Career Access and also the Associate Dean of Graduate Studies and Research at California State University at Los Angeles says: "The database monitoring system is very essential and it is very important, because it is one way, one method, or one mechanism of actually measuring the project's success."

At this time I would like to recognize all of the attending CRCMs, their principal investigators, and project directors.

It is a pleasure to introduce now Dr. Brown, who will introduce other National Science Foundation officials.

COSTELLO BROWN
CRCM Program Director
National Science Foundation

First, I would like to say good morning to everyone and thank you to Dr. Jones, who has been the primary person in charge of getting this program together. I think she has done an excellent job.

A number of people at the National Science Foundation have been involved in the program. Some of them are here. Others you will meet later on. I would like to introduce, very briefly, for those of you who do not know him, Dr. Williams, who is the Assistant Director of the EHR, and Dr. Calbert, who you will also meet in a few minutes. Dr. Johnson is not here. She is in charge of the diversity conference and is working very hard on getting that together for the end of the month.

Dr. Wanda Ward is the Career Access Program Director, who will also be coming in later. Dr. Susan Gross is here. She has been working with us in getting together the database material. She is from the Division of Research, Evaluation, and Dissemination and has been instrumental in the technical aspects of the database. Dr. Floraline Stevens, who is from that same division, has been working with us and other divisions with the evaluation component for the CRCM.

BETTY RUTH JONES: In conclusion, we have something else we would like for you to do. We want the entire audience to please stand. Turn around to the person next to you and shake hands, and please say this is going to be a successful and productive day. We thank you very much for coming.

OPENING PLENARY SESSION REMARKS

LUTHER S. WILLIAMS
Assistant Director,
Education and Human Resources
National Science Foundation

Thank you, Dr. Brown, and greetings to all of you. I will have some comments to make at lunch, so I will be very brief this morning.

By way of agreement with Dr. DeLoatch's observations in terms of the significance of this conference, I want to make several comments that, if you will, are larger than the domain itself. That is, I would like to lend credence to his observation that this is an excellent, in fact, a unique opportunity.

If you think back very carefully over the past decades of U.S. history, from the end of World War II to date, about serious engagement in postsecondary education with respect to science, engineering, mathematics, and technology, you will realize the broad issue of minorities has never been on the agenda in any serious fashion. So the gains that were made were made at the margin. I am convinced from a variety of perspectives that this is simply no longer the case, and therein is a window of opportunity. Our workshops should not be restricted to that agenda, because it has to be placed within the context of larger issues.

There are, to give reality to my observation, actions taken on this new agenda on almost a day-to-day basis. Clearly, the Clinton administration is leading nothing short of restructuring American society. I would argue that this would be the case regardless of who is the national leader. There is one overarching national strategy for addressing the welfare of the American people, and it is simply as follows: Technology will serve as the vehicle for the translation of a variety of products to international marketing that will, in fact, be responsible for economic productivity.

Now, if you think through what I just said, that means a youngster, minority or otherwise, attempting to learn sixth-grade mathematics or science is, for the first time in the history of this country, connected to the country's welfare. That circumstance never existed previously. So, the possibilities, the opportunity to make gains in this area, are not only enormous, they are new. It is a window of opportunity that obviously, like everything else, is finite. If it is finite, then there are broad issues that bear on credibility.

As the national scene evolves, education and human resources are clearly at the epicenter of it. Everything that has taken place in the past year and a half supports that statement. It is true to the Executive Branch of the government. From the scientific and engineering industrial sector, to the U.S. Congress, to the business community in general and the national–international community, everyone acknowledges the fact that education, training, discovery, product development, economic productivity, or productivity gains are part of one continuum.

Certainly, for the individuals in the public school system, this is a remarkably important transition, one that in many quarters is not fully appreciated. The public schools' mandate is no longer to deal with, if you will, the affective or somewhat aculturization-specific dimensions of life. It is part of a continuum that will define the welfare of the country. It does require, as several people have indicated, a collaboration by all of the players.

In fact, the diversity conference scheduled for later this month will seek to finalize its version of a national action plan. This plan draws upon the participation of individuals from the K–12 sector and, as Dr. Richardson mentioned, the collegiate sector, along with the government at the state and Federal level, in a variety of community-based organizations. The emphasis in this plan is action. What we have done is to create the opportunity within the administration to actually submit this plan with the hope that, after alterations and revisions, it becomes at least one version of a national agenda.

"As the national scene evolves, education and human resources are clearly at the epicenter of it. Everything that has taken place in the past year and a half supports that statement. It is true to the Executive Branch of the government. From the scientific and engineering industrial sector, to the U.S. Congress, to the business community in general and the national–international community, everyone acknowledges the fact that education, training, discovery, product development, economic productivity, or productivity gains are part of one continuum."

LUTHER S. WILLIAMS
Assistant Director,
Education and Human Resources
National Science Foundation

There is nothing unique with respect to our efforts. We have simply decided to take up the matter, because an action plan is going to be developed in any case. The country simply cannot accomplish what I have referred to without that kind of overarch-

ing strategy in which there are real milestones, definitive outcomes, and unit accountability applied to all.

"The CRCM program has evolved from projects that consisted, in the early years, of enrichment activities for only a few students, to now where we have projects that are systematically addressing problems and barriers for thousands and thousands of students in both urban and rural environments. This period also represents a time for reflection on our expectations and goals, at a time when resources are getting scarcer."

ROOSEVELT CALBERT
Division Director,
Human Resource Development
National Science Foundation

I do not regard this very important conference in this elegant hotel in Baltimore in a parochial context. It is not. Even if the summary of your activities and the transactions here today are focused on CRCM, CRCM is a program with which you are associated and a program within the context of the National Science Foundation. But if it only resonates in those two arenas, bluntly put, it is not important. What, in fact, you have to produce is an outcome that is going to be meaningful to all the participants in this broadly based continuum, because that is the focus of the challenge and the problem to be addressed.

So, I look forward to your deliberations on databases, but what you are addressing is how to take a finite resource against an explicit program plan and be successful and able to demonstrate that, in fact, it is successful. Most assuredly, the effort in this case, as it should be given the need, is properly devoted to students underrepresented in the enterprise. But, if it is going to be important and sustained in a knowledge-building context, it must be an exercise that informs the whole country.

Thank you. I look forward to a productive meeting.

ROOSEVELT CALBERT
Division Director,
Human Resource Development
National Science Foundation

To Dr. Williams, Dr. Richardson, Dr. Gonzalez, Dr. DeLoatch, Dr. Yates, other special guests, friends from all the visiting CRCMs and other NSF colleagues, it is a pleasure for me to add my words of welcome to all of you, particularly to our visiting friends, and to express the National Science Foundation's appreciation to all of you who worked to make this conference a reality. I give special thanks to Dr. Betty Jones, Dr. Edmonia Yates, Dr. Costello Brown, and Dr. Eugene DeLoatch. I am sure there were many persons behind the scenes who helped you to put this conference together.

Many of you remember when we first met to talk about the issue of evaluation and program realignment. We met in places like Puerto Rico and Chicago, Illinois, and each time getting closer and closer to the elusive tigers called program and project assessment and evaluation. In terms of that, I wish we would take just a moment of silence to remember one of our fallen colleagues, Ted Reid, who was here during the early years of this program.

This particular time span today represents yet another period of transition in CRCM history. The first two projects that were established in Fiscal Year 1987 completed five years of the program in Fiscal Year 1993. In Fiscal Year 1994, four additional projects will complete their fifth year in the program during this transitional process.

The CRCM program has evolved from projects that consisted, in the early years, of enrichment activities for only a few students, to now where we have projects that are systematically addressing problems and barriers for thousands and thousands of students in both urban and rural environments. This period also represents a time for reflection on our expectations and goals, at a time when resources are getting scarcer.

What have we accomplished in the first five years? What really works and what does not? What partnerships work best? Is it the partnerships among Federal agencies, institutions of higher education, school districts, and private organizations or among parents, teachers, and administrators or, perhaps, among community-based groups, teachers, and administrators and, again, the private sector?

These are questions we would like to answer in Fiscal Year 1994, and today marks the beginning of finding answers to these critical questions. The first five years of CRCM have been a learning experience for all of us. We think we have made a great deal of progress. Yet, we still read a lot of negative press about the Nation's educational system. We must find a way to document and disseminate the good things we are accomplishing. I hope that, at the end of this conference, we will know better how to do this for the CRCM program.

We realize that the task of improving college mathematics and science educations for minority students is difficult. There are no immediate solutions that will operate equally well in all school districts. You have been diligent in your efforts thus far, and you must continue in partnership with the National Science Foundation.

PURPOSE, HISTORICAL PERSPECTIVES, AND DATABASE UPDATE

BETTY RUTH JONES
CRCM Program Director
National Science Foundation

COSTELLO BROWN
CRCM Program Director
National Science Foundation

The remarks of Drs. Jones and Brown are included as part of the Western Regional Conference, pp. 84.

OVERVIEW: THE MINIMUM OBLIGATORY SET (MOS) REVISITED

LLOYD RICHARDSON
CRCM Technical Assistant
University of Missouri

CARLOS REYES
Senior Analyst
Quantum Research Corporation

Good morning. We are going to try to take a little bit more of an informal approach to this. We are going to move into the working portion where we will go through the database variables and look at the differences. After we have finished, we will come back and discuss them together, rather than trying to discuss each one as we go. Many of us bonded together in Atlanta, as was said, and we should learn from our experience there. My role in this conference reminds me of being in the service, when someone said, "Who would like to drive the colonel's new vehicle?" I raised my hand, and I spent five days behind a wheel barrow.

So, actually John Gregory deserves quite a bit of credit. Stand up, John. What happened, and I think the reason that you see me here, was that John was smart enough not to agree to work on it. We took the approximately 350 variables that everybody said could not be collected, and we maintained them in an efficient manner and computerized them. I did it on an IBM. He did it on the Macintosh, and many of you have modeled your database development based on one of these two platforms.

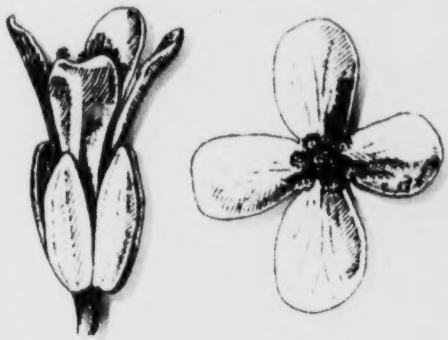
In that sense, I am your representative to the people who are going to be analyzing the data for NSF. I am of the interplay that can provide the historical recollections of why we have things the way we have them, but not because I am any expert on anything. So, with that said, I wanted to be sure to give John enough credit.

We are going to hand out a draft version of the MOS and work from this. I am going to encourage you, if you will. This is Carlos Reyes, who is Quantum Research Corporation's data analyst. He is extremely competent and can answer questions for you.

What we are going to try and do is go through that MOS handbook with you. Please read the materials during your break, on your own time. I would like to have you turn to page five.

I want to welcome you this morning, because it is about time for us to revise the MOS. Part of the presentation is really Quantum Research, and I put this together, so I will not blame them for it.

I would like for you to look at the databases on page four. There are three of them, and I will take the blame for this. I think it is very important that the PIs (Principal Investigators) stay with us. One thing that we have learned over time is that, when the PIs and the data people are not there, you have the data person going back trying to communicate what was said in the meeting. Then you have a second and a third level of communication. Whereas, when both are listening, one listens for technical aspects, and the other listens for program considerations. Between the two, you get a much better interpretation of what is actually going to go into the MOS. So, that is the primary reason for requesting that PIs remain. We are going to look at three databases. The first one is the program database. Then we are going to go to the student database and lastly the teacher database.



I will now focus on page five. This screen tries to point out the need to format information. That is the information that will have the variable name. It will tell you something about what type of data you would expect to see in there.

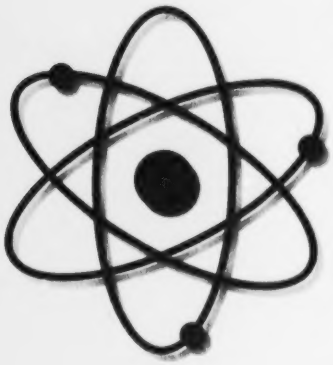
The green part, the second part in the description of a variable, is going to be some explanation of what ought to be found inside that area. Then the yellow, or the third area, includes the possible choices, where there are specific choices.

At the top, you have the variable name, which will be the first section of data, the second section, and the third section. That is what the page is trying to say to you. It was a little bit hard to get a graphic that actually demonstrated it, but I think, I hope, it is clear enough.

Let us go to the program MOS. In the program MOS, the first thing is the center code. That is going to change. Because

of the number of centers that are coming into being, we are moving away from a single letter and you are going to be assigned two letters. For example, St. Louis may be "SS." I have not seen the actual assigned codes. You will need to edit your database merely to include that.

The next variable there, number two, is the CRCM program number. Now, that one has been a bit of a problem. There has been some misinterpretation of that particular variable. So, we will explain and, at the same time, try and change it a bit. So, please take note of the changes.



Each program in your center within a given year should be given a program number. So, let's say you have a Saturday academy and the numbering for it is 17. So, you have assigned it a 17. This happens to be a three-digit field, if you will notice up in the blue. So, number 17 would be coded as "017." You need leading zeros. That is what we are going to see at the bottom.

Now, a program that runs in your center over different years is going to carry exactly the same number. That is a change. We were reassigning it a different number every year and that has led to some problems. So, there is no need to assign it a different number. If your Saturday academy is titled number 017, it will be number 017 every year in your center's existence.

Using the technique of someone I have seen speak, I am going to put my watch down here, and I am going to move along. If you have any questions, jot them down as we go along please.

Be sure to include leading zeros on that particular variable.

The title description has changed. The title description is now 80 characters. It was 50. I hated that. In my center, it is tough to get a description in 50 characters. You would think that 50 is a lot, but it is not. So, we went to 80 on that. That seems adequate. The target population is asking you for the primary. Be sure to look at that word, primary target population. If your primary population is both students and parents, fine. If your primary population is both students and teachers, fine. But if your primary population is students, then do not list it as a student and teacher program.

There was some confusion in the first version of the MOS about the student activity component. So, this is one of the changes. If you say that something has to do with students, then you will fill in the student activity component. If you say this is for administrators and teachers, please do not fill in the student activity component because it will not be applicable.

In each case, we have also had a problem interpreting the data when you have blanks. We cannot tell whether a blank is missing data or if it is real data and unknown. That differentiation has tried to be cleaned up here.

The next information has to do with the activity component. Who is the primary provider? That is a piece of information we were not able to put into the early versions. You may have many providers. It is your decision who the primary provider is. So, your choices have to do with whether it is business and industry or consultants or postsecondary academic institutions. That is, you are using faculty or university lab facilities. Are you using K–12 teachers? Are they providing? Are you using senior students working with ninth graders in a mentoring relationship? It may be CRCM staff. It might be your informal science people. So we changed this section.

If you have listed something as students and teachers, then you would fill in both the student part and the teacher part here. That was not possible with the earlier database. On the other hand, if it was not a student, it is not applicable. If a teacher was in a service workshop, then you would fill in the teacher activity component type first. These seem to be the appropriate types of categories. Then you would identify who is the primary provider of that teacher activity. Those are kind of tagged together based on the provider.

The next thing is a parent activity component and the parent primary provider of that activity. That is a change. Those sets of variables need to be modified, and the modifications should not take much time or be difficult.

There seems to be some confusion about the earlier variable of program delivery site. That was modified, and I think it will be much better for us. The question regards the delivery and meaning site. That term got changed in the title of it. In the old MOS, it was called program delivery. It is now "program delivery meaning site." Some people got delivery mixed up with mode.

Where the activity occurs—in a local school, as a part of classroom instruction or in a local school in some other capacity, for instance, after school—is another variable. Is it a commuter or a residential experience? Residential means dormitory-oriented; the students reside on the campus. At my campus, we do not have any dormitories. They would have to pitch tents.

The program time frame—in many cases, you want to sort out what programs are running in the

summer, versus during the academic year or all year long. Variable number 12 seeks to do it.

The next one is your non-NSF contributions. This one has changed about five times over the history of the database. So, it depends on what you pick up and read. Early on, it was direct cost only. Later on, it was both direct and indirect. Now, we are back to direct costs; it is then a cleaner variable. It is a seven-digit number. You round it to the nearest whole number, and please do not put in commas, decimal points, cent or dollar signs—just digits. It really should not include in-kind money. We will need to come back and discuss number 13.

The NSF contribution is the same thing. It is a seven-digit number. There is a difference between zero and blank. We were getting a number of programs that showed zero dollars used. You didn't know if zero meant that it wasn't applicable, or if you did not have any information about how much NSF money was devoted. So, this seeks to clarify by allowing a "-999" to mean that you do not know.

Now, here I am going to take a moment, because this is where PIs really need to focus. Data people are disliked by your programs. That's a terrible term, but I like to polarize things.

We are like gnats. We are always buzzing around, and we are bothersome. The PI's goal is to get down the road with the program. Who is this guy who wants to come in and collect data? You need to help communicate to all of your program people that one important activity is filling out program information and getting it back in a timely manner, not the day before the download. Also, information about your program is tagged with student information. So, if you do not have the program information, you do not know what the program was.

You need to help your evaluator get that information in a timely manner. From my phone conversations with PIs over the past year, the one thing I find is that the evaluator sometimes has a rough time getting information from the program people because the PI is not firm in his requirement that information be submitted on time.

Variables 15 to 27, as before, have a yes–no entry. I am going to tell you how I am guilty. My database has only yes's, because I throw it up on a screen and I do not want to enter yes's and no's. It will hurt your eyes after about an hour of looking at a full screen of yes's and no's. So, I have only yes's. When I download, the first thing I do on that variable is go through and put in the no's. So, my data people do not have to look at that.

The problem is that some people did not do that. What you get are some blanks. Now, what are blanks? Are they no's or unknown?

What we have tried to do is clean that up by saying you should put a question mark in the grade levels you do not know. If you do not know if a program is six through eight or seven through eight, then you put a question mark in six, not a "no." On the other hand, I think you ought to know your programs. I find it hard to believe you do not know. If there is an error, it means that you have done something wrong. I understand from Carlos' perspective that he has a need to know the difference between unknown and wrong data. Enough said.

I will use St. Louis as an example. St. Louis had two or three programs that didn't sum to 100 percent, because their evaluators worry about everybody else's data. When you fill this out, you ought to make sure this sums to 100 percent, because you are doing 100 percent. Let's say you are doing some chemistry and also some engineering, but you do talk to them about career counseling or something else. Well, if chemistry is 60 percent

and engineering is 30 percent, then put the other 10 percent in "other." If it does not fit in one of the categories, make it "other." It should sum to 100 percent. That is not hard, and I hope that St. Louis will clean that up.

Contact hours—There has been a lot of confusion about contact hours, especially when it comes to residential programs. So, there are a couple of things. The total contact hours is per student. If you determine that you have 70 hours that you are meeting with the students, even if there are 30 students, it is 70 hours per student.

The computation that ought to be used for residential programs is 14 hours a day, not 24 hours a day. I know you are responsible for them, but it gives you an inflated number. So, we came to an agreement of 14 hours maximum per day in residential programs. For nonresidential, count only the actual hours.

This variable has been one that has plagued us. You downloaded your 1991–1992 data, and some of you had kids in 1993 programs. Be careful to remember—and do make yourself a note here—that in order to report it with four digits, it goes with the funding cycle. If it is the 1989–1990 funding cycle, we use 1989. Last year's data, the 1991–1992 data carried 1991. I will bet there is a third of that data where people enrolled kids in 1992 programs. The 1992–1993 year that you are going to download in December should say 1992, even if it occurred in the summer of 1993.

The summer of 1993 is part of the 1992–1993 funding cycle.

That variable is a painful one, because you do not know if people have got the wrong kids in there; if they are reporting people from this year when they are really supposed to be reporting last year. That is probably one of the key variables that has caused difficulty in analyzing the data.

The last field is one that is going to change just a little. Carlos went through the data, and after the second download, we were able to identify some programs that seem to be in most centers. So, these are the categories that seem to replicate across a lot of centers. You will find Saturday academies, pre-high school and precollege bridge programs, summer camp institutes, and family mathematics and science. So, we will create a classification, and maybe that will be an easy way to analyze those without having to worry about the titles.

So, at this point we want to see what the classifications are. If in fact you cannot find a title that is yours, then you use the "not applicable." What that means is, this year, we are going to look at the "not applicables" and see if there are a whole bunch of those that fit into the same categories. If so, there's another category that needs to be there.

So, this is a new variable. It is an experimental variable in terms of how useful it is going to be, but I think it is going to turn out to be quite useful in categorizing programs.

That pretty well is the end of the program MOS. Let's try and go through the next couple of these, which are the student and teacher segments. Then we will go back and hear the questions.

What we have planned is the following. We are going to go ahead through the student database and do an overview of the variables. Then we are going to go through the teacher database. Later, we will come back to the program database and do an activity or two after we look at some of the variables.

The center code in the student database is once again going to be changed, so that you have a text field two spaces wide. The social security number is going to be added. That, I think, is a new variable. How many centers have maintained social security numbers already? Do not be embarrassed. Raise your hands high. Yes, most of us have.

I think in the long term, we are thinking about moving toward using social security numbers in the databases, because they are now required of all citizens in the United States. Early on we did not do that because the precollege students did not always have social security numbers. There will be a mechanism for those students who do not have one; if a social security number is not available, you will create it as a random number. It will not be a number that is easily tagged with a student for identification. How it is created is irrelevant as long as the first three digits are zeros. It will be a text field. The first three characters are going to be zeros. It will need to carry the dashes. The last thing is some information about how that number is made up. I will keep a small data file and assign the next number and keep up with what the last assigned number was. There is no order to assigning those to anyone. So, I do not see any problem with that.

Earlier, I may have inadvertently said monitor the kids, but what I meant by that is our ability to be able to track them not only from program to program and from year to year, but from one type of program to another type of program. I will tell you as an aside that I think this is a potential source of some concern. I think the parents and kids may be concerned, but that is just my view. I am a bit too conservative at times in my perception. That is why we initially did not use social security numbers. In this day and time, I think it is a valuable tracking mechanism, especially since we are having some difficulty with the ID number that we are assigning kids.

Many of your programs had the same person with the same ID number with totally different information in the same program. So, you do not know if that is an error in terms of assigning two different people the same ID number, or because you have that record duplicated in your database, or if you have downloaded that person's data and then edited that information and downloaded it again. A social security number will take care of that. That is one of the reasons for that change.

The birth date tends to be a bit of a problem. Some of you are having trouble with how to handle date fields. You need to look at how your software handles date fields. The one thing that is nice about DBase in particular—and I am not pushing that as a package to you—is that it stores the information as month, day, and year. In other words, let's say, 11, 17, 93. That is "11/17/93." But when it downloads it into a delimited area, it automatically converts it to 1993, 11th month, 17th day. So, you need to look at how your software is handling that, because that is one of the error problems we found. Some people ended up with dates where kids were born in 1915.

The ethnicity variable really has not changed, except I believe we added a question mark for

"unknown." If it is a blank, you cannot tell if the blank means it is unknown or if they consider it something different.

Gender and disability—For the gender variable, we added the question mark field, because with blanks, once again, we couldn't figure out if that was cross dressers or if in fact meant you just didn't know. For disability, enter "yes," "no," or "unknown."

Grade at first entry is a field we want to enter. I think this has been changed to a text field. I believe if you check in the previous one; it was not. In this one, grade K is 00. Grade 1 is 01. Leading zeros need to be there.

The date that we initiated this person into the tracking system is another piece of information. Once again, it is in date field format, where you will have the year 1993 or whatever as the leading four digits.

We have added "tribal" to the type of school variable, because of the Montana Group in particular. When you have Native American environments, you are going to find they have schools that do not fit the categories we had. So, that accommodation needed to be made.

CRCM status is an ongoing variable with ongoing problems in meaning. We will come back later and discuss that variable and what it really means.

The date of the CRCM status is a date that goes along with the current status. That date changes when you update the status. Anytime you update status, that date changes to the current date. So, that date should reflect the last time you have updated the status of the student.

Exit date—You will not have an exit date unless you have an exit reason and a student exits the program. If you have a reason, you should have an exit date. Some people had an exit reason and no exit date. Others had an exit date and no exit reason. It is not clear whether that is missing data or incorrectly entered data. So, exit date is associated with the exit grade level, which is associated with the exit reason. These three things go together. If data are entered in one of them, data (not just defaults) should be entered in all three.

For the reentry code, just put a "1" in there. A student begins. He or she is in your center for the first time. The variables are "0," "1," and blanks. It is very simple. The first time the student is in there, enter a "1." If he or she exits and reenters, that is the second time. So, you then enter a "2." Unless he or she has exited, it never changes from a one. That is not difficult to do.

Current grade level—Current grade level ought to be between K and 16, taking them through the college level. You are going to track information on students who have graduated and maintain information about what has happened to them as they go on to college. So, that can be K to 16, and there again, it is a text field with leading zeros.

The program linkage variable contains the following information. If a person is enrolled in more than one program, you are going to repeat all the information except for variables 17 and 18. Those two variables will reflect the two different programs she or he was in. If a student is in two different programs in the same year, variable 18, the year of record, will be the same. Variable 17 will carry information about the two different programs the student was in. So, you will have a line of data that has to do with the first program and a line of data that has to do with the second program. All the other fields should be the same. Here again, that second one has to do with the year, and remember to go by the funding cycle for the year. Be sure to remember to use leading zeros when it comes to the program number.

The next set of variables, 19 through 88, you complete only for sixth through twelfth graders.

Career interests—If your form asks a student what career she or he is interested in, and she or he is in sixth grade, my hunch is he does not have any idea what you are asking. So, I would suggest that you ask that and then you and your center go through and make that classification. Otherwise, I question the validity of the data.

> *"We are going to try to take a little bit more of an informal approach to this. We are going to move into the working portion where we will go through the database variables and look at the differences. After we have finished, we will come back and discuss them together, rather than trying to discuss each one as we go. Many of us bonded together in Atlanta, as was said, and we should learn from our experience there."*
>
> LLOYD RICHARDSON
> *CRCM Technical Assistant*
> *University of Missouri*

We are going to add one field. We have always had an interest in whether the person was interested in teaching. Another question NSF would like to address is whether the person is interested in doing research, but we cannot accommodate this in the current MOS format.

Variables 22 to 25 are basically the same, except for the year. There has been some confusion about GPAs. Is it cumulative GPA, or is the GPA for that year

only? What does that GPA represent? The MOS is trying to give the GPA only for that specified grade year. So, if a student is in tenth grade, you want to know his tenth-grade GPA, not his ninth–tenth cumulative GPA.

The next set of variables I had to break into two screens. It is unreadable otherwise.

Everything will be answered the way you see those boxes at the top. Truthfully, we had a problem when we initially set up the MOS. We would enter individual grades, but if NSF then asked us how many students are currently enrolled in algebra, we would not know. We only know their grades, so we could not answer that question without having to go back away from it. Also, if they asked at what grade level people completed the following, or how many students completed algebra at the eighth-grade level or ninth-grade level, we could not tell. All we knew was their grade and not what year they took the course.

So, this is a very good change in the database. It is the grade received versus the year the class was taken. We are going to go with A, B, C, D, or F. Some of us have had zeros in the database because it was stored as a numeric field. A blank numeric field, when it downloads, sticks a zero in there. So, you did not know if the zero meant an F or if it meant the student had not taken the class. Because of the way databases download information, we have now changed this to a text field. If you look in your old database, it will be a number field. One of the things you will need to do if you modify your database, rather than reenter all this data, is tell it to take this number field and change it to a text field.

The problem you may have is what your software does with blanks. It may take a blank and make it a zero. If so, you will need to do a global edit and get rid of the zero. Then you start fresh. This is not a big change. This is a couple of commands, and you are on your way.

The problem will be with the grade level taken variable. We will not know that information for the past records. So, you might wonder what to do with that. I will prepare a particular handout for you.

As I was preparing for this conference, I tried to gain a few moments of life. So, we had a high school program starting up soon that would enroll 1800 students. I did not want to go back and redo 1800 people. So, I am going to take a chance that they are not going to modify this too much in D.C. What I am going to do is ask for what I think I need in the way of these changes.

The reason for this form is to try to get some of that information. If you look at the back sheet of the form, what you will notice is I have asked students what grade they received in a course and in what grade level they took it. In other words, they are asked to put the grade and year. So, I will try and pick this up from my past information and be able to edit it into my file. I see a blank stare. Does that make sense?

Somebody will ask me if we have to go back and change our databases. The answer is, I am going to try and get that data. I do not think it is going to be a requirement. I think you would be smart to do it so that you are able to get better information for students you currently have in your program. For new students, it will not be a problem.

So, the answer is not yes or no. It is whatever makes sense. For me, it makes sense to try to pick this up in a quick and clean fashion. It is also a cross-check. I have in my database that a student took algebra and earned a C, let's say. I now come back and notice this student tells me that she has an A in algebra, and she took it at the eighth-grade level. I have an error somewhere. So, this will give me a cross-check on things my coordinator needs to go and check.

One problem was putting grade level or grade on there, because you have grades on both sides. So, I tried to warn my coordinator to please emphasize those directions. I am hoping my program person who handles that component will look at those and feed them back to people to ask for the data.

These things are now paired together, and I tried to break that out so you could see graphically that the mathematics courses go together. The next thing has to do with the computer courses. There are two computer courses to be tracked. One of the things you want to take note of is that computer science technology does not include word processing, spreadsheets, and databases. That first course does not include those things. I pulled that out for you to try to highlight it.

The next variable has to do with the year of graduation. We want to keep up with when a student graduates.

Then there are a few additions. These are things that I do not think will cause us much difficulty now because some of us, in terms of being in operation, are in the twilight of our existence. Some of you are at the beginning of your pipeline existence. For us twilight people, we will have some data to collect here. For those who are just beginning, you will not have had that many graduates yet. So, this will not be too difficult for you to enter in. For us, we will have to go back.

One of the things that we will try to do is identify the ACT scores and identify the meaning of 1, 2, 3, and 4. I think the reason for that was because, when we did this, we couldn't remember what 1, 2, 3, and 4 was on the ACT. Who knows? We will talk about that. What are the

four things they report? There is ACT verbal, ACT math, ACT science, and a composite. When you get the edit of this, I is probably going to say ACT verbal. The next will be ACT math. The next one will be ACT science, and then four will be a composite.

This field, by the way, is the student's first attempt. This is set one. We are going to try to allow an opportunity for a second testing. So, if the student goes back a second time, you will be able to look at the differences between those scores. Of course, if you do not collect the data, you certainly cannot look at differences. Whether or not it is helpful in terms of analyzing it once you have the data is questionable, but we are going to try to collect it.

There will be two versions for the PSAT as well. We will want to know the scores on the verbal and math and at what grade level it was taken. Set two is the same thing. What are the scores? What grade level was it taken?

Then the actual SATs, set one, including at what grade level they took it—that is new information. Your database needs to be modified to include that. Frankly, it should have been included from the start. We did not perceive it correctly when we initially started out on this. I do not remember why we did not get them, but I think it was because everybody was so scared they could not collect all those 350 variables, let alone more.

Post-high-school enrollment—this is going to have to do with whether they enroll in a two-year or a four-year college. We will come back and discuss that in a little more detail later.

The next thing has to do with their majors. Frankly, I used part of the screen from another one. They may or may not know what those things mean. I would ask them what they plan to major in and classify it yourself. Do not ask the students to classify that.

That is a synopsis of the student database as it will be.

If we look at the teacher database, there is not as much information in it, because in most centers, the emphasis is on students and not on teachers. Some have thought about whether or not teachers should go in the database. They have worked with the students in a program, and then they want to deal with the teachers.

One of the decisions you must make is whether the teachers you put in this database are necessarily the teachers who are working with students that you have served. They are teachers who have received in-service or curriculum development instruction. That is a key decision point about including a teacher. Just because you have dealt with their students, you do not track the teacher. If you have done in-service instruction with that teacher as part of your systemic program inside a school and worked with the students as well, that is fine. But the teacher needs to have received direct services from you. That is the key ingredient. I think that cleans it up as to who goes in and who does not.

Once again, we have the center code. We have the social security number field. We have the ethnicity field. We have the gender field. Basically, those are the same as in the other databases.

This highest degree attained, that became a bit of a problem as to what is an MA and an ME and a Ph.D. There were some weird classifications. So, we just decided that it would make more sense to look at whether they were Bachelor's; a Master's; a Specialist, or some advanced certificate, like an Ed.D.; or a Ph.D.

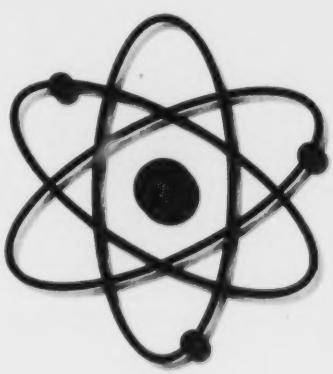
Once again, the major, the level that they teach. Middle school is going to mean intermediate or junior high. Those are all one category.

Other variables concern certification. Are they certified in mathematics/science? Are they teaching in the certified area? The program linkage is basically the same, except the number of that variable, where it appears in your database download, is different. These are numbers 10 and 11 in the teachers' database. The information is exactly the same.

The next page, you will notice, does not look like this screen. I tried to get it all on one page. If that bothers your eyes, I apologize. What I basically did is 12, 13, 14, 15, 16, and 17, because I wanted to talk about 17. That is any other science course other than those. You need to put in that they taught some other science course here. Then you get the mathematics courses, which have a fairly exhaustive list. If it does not fit one of those categories, you put it here.

If they teach some other subject matter, such as home economics, that goes here, and the field will allow you to type in up to 20 characters. At this point, that list seems fairly exhaustive, but we tried to leave the opportunity that, relevant to other subject areas, there may be something there. Also, it will give us some information if they are cross-teaching between mathematics and coaching or whatever.

That is the synopsis of the teacher database.



Eastern Luncheon Session

GREETINGS AND WELCOME

MAURICE B. HOWARD
Assistant Superintendent for Curriculum and Instruction
Baltimore City Public Schools

It is a pleasure to welcome you to Baltimore City. We hope you will enjoy your visit here and leave with some sense of the renaissance that is occurring in our school system.

For the past six months, I have had the pleasure of working with several members of the staff of Morgan State University in evaluating their CRCM project in Baltimore City. I believe this approach has tremendous potential to improve student demonstrations of learning in mathematics, science, and engineering.

As I pondered what to say this afternoon, I was reminded of a recent golf outing with Dean DeLoatch. When I went to tee off, I missed the golf ball and hit an ant hill. Ants flew out everywhere, and the casualty level was high. I tried to hit the ball again, missed again, and many additional ants were slaughtered. I overheard two ants talking. The advice of one to the other was, "If we are to be saved, we had better get on the ball!"

I believe the same statement applies to educational institutions in urban areas, particularly as we look to student mastery of essentials in mathematics and science. We must get on the ball, for we are losing many students, not reaching countless others, and expecting too little of all.

For this reason, I wish you a meaningful conference, at which each person learns some important technique, strategy, or approach that really makes a difference in mathematics and science education in your locality. Have a great conference.

KEYNOTE ADDRESS

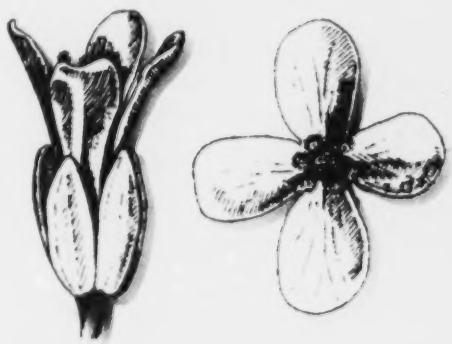
LUTHER S. WILLIAMS
Assistant Director,
Education and Human Resources
National Science Foundation

I am pleased to join you at this Eastern Regional Conference addressing strategies and processes to achieve greater accountability in the Comprehensive Regional Centers for Minorities (CRCM) Program. This conference is not called to render a forum for unabridged recitations of generalities and vague possibilities of promised achievements or all-encompassing laments of the cumulative results of organizational or structural inequities. Rather, it is designed to collectively instruct the next endeavor in a growing series of efforts to enhance the specificity of CRCM programming and the predictability of student outcomes. The task at hand is to identify areas the individual CRCM projects have in common, as well as the differences between them that will lead to strategic addresses of an even more successful CRCM enterprise as it bears on mathematics and science K–12 education of ethnic/racial minorities underrepresented in the scientific and technical affairs of the Nation and the international community.

A slew of studies and reports has presented a clear picture of underrepresentation in science, engineering, and mathematics. The picture looks bleak across all levels of talent and interest, from the need for basic literacy in science and mathematics for all, to advanced education for the most highly motivated.

To cite specific findings:

- In the recently released survey of adult literacy, "Adult Literacy in America," by the National Center for Education Statistics, September, 1993, the average literacy levels for African Americans and Latinos ranged from 80–90 percent less than that of whites for prose, document, and quantitative literacy.
- The Council of Chief State School Officers issued a report, "State Indicators of Science and Mathematics Education 1993," that considered the aggregate consequences of the paucity of ethnic minority mathematics and science K–12 teachers, the minimum educational resources available to schools in which substantial numbers of African-American and Latino students are enrolled, and the approximate twofold difference in performance of these minority students, as compared with whites, in the 1992 NAEP assessment of basic level of achievement in eighth-grade mathematics. The report asserted that an accurate description of K–12 mathematics and science education is a "Nation divided, unequal."



To be sure, minority underrepresentation and participation in science, engineering, and mathematics, which have been viewed heretofore only as equity issues, are now understood to be essential to the future national welfare. It now represents an invest-

ment in scarce human resources, and we must respond immediately and comprehensively.

Nonetheless, the centrality of science and engineering to contemporary national affairs and the participation of underrepresented groups in the enterprise necessitate a history lesson. Succinctly, what are the historical causes of the current paucity of minorities and others in science and engineering? I state categorically that this paucity within the ranks of scientists, engineers, and mathematicians is not the result of some misdirected social policy. Rather, it is one dimension of a larger story in the American society. It therefore needs to be understood in the context of past ideologies, practices, policies, and expectations. These policies and practices worked quite well, and thus today, we gather to discuss the cumulative debts that occasioned the lasting consequences of educational retardation, if not deprivation. We must, therefore, take cognizance of the durable past and forge a new paradigm distinguished by pragmatic, quantitative goals for setting a national strategy that go beyond equity issues.

The task before us is to reformulate the problem and broaden the landscape for participation. Reconfiguring the problem is becoming enormously challenging. Let me preface this subject with a story. A surgeon, an engineer, and a politician were arguing about whose profession was the oldest.

"Obviously mine is," said the surgeon. "Eve was formed from one of Adam's ribs. That is surgeon's work."

"Wrong," said the engineer, "Genesis tells us that the heavens and earth were formed out of chaos. Clearly an engineering task."

"Oh yeah?" said the politician. "Who do you think created the chaos?"

In part, the implementation of a revised national effort must rise above the chaos occasioned by limited, non-goal-based, highly fragmented, and otherwise inadequate past and current programs. Thus, NSF has initiated a series of programs to address recruitment and retention of minorities at each level of NS&E education.

First, several years ago, the National Science Foundation began to take stock of its programs aimed at increasing participation of minorities with an eye to developing a long-term strategy for addressing the issues. I was fortunate to be included on the task force studying minority programs, and I believe we have developed goals and strategies for implementation that will lead to the kind of reformulation that we must see.

The planning effort was designed to

- Identify underrepresented minorities with strong abilities and provide incentives for them to pursue undergraduate study in science and engineering fields.
- Intensify NSF's leadership in promoting participation of minorities in science and engineering.

The Alliances for Minority Participation (AMP) Program is focused on the undergraduate level with links to the precollege, graduate, and postgraduate levels. It complements the resource centers and supplements the research careers program to cover the entire educational pipeline. Local initiative and project design are important to the AMP Program. The critical problems—whether in precollege or in higher education—may be located at different points along the educational pipeline in different areas, and the strength of the links across key joints on the pipeline may also vary. These local differences cannot be known to any single agency such as NSF; they require active participation in program planning at the local level, and I mean local in the disciplinary as well as the geographic sense.

NSF does not have the resources to substantially enhance minority participation in science and engineering training at each level of the education continuum. Rather, we must encourage the formation of new coalitions among leaders in the academic community (including both majority and minority institutions), the private science and engineering sector, private foundations, and other Federal agencies. This approach was designed to occasion long-term commitments for change through the formation of alliances between academic institutions and those in other sectors. Full participation by the academic community is essential to solving the problem of minority underrepresentation in science and engineering.

NSF awarded six AMP grants in Fiscal Year 1991. These six projects collectively have the goal of doubling the current aggregate minority student enrollment to yield 11,000 Bachelor's degree recipients by 1995. Each program rests on three interrelated requirements: First, the design of the alliance must be based on sound knowledge of programmatic approaches known to be successful and cost-effective. Second, each alliance must acknowledge that fragmentary efforts are inevitably inadequate responses to the obvious scope and scale of the problem. Third, innovative strategies are encouraged. Five additional AMP

awards were made in Fiscal Year 1992, and four awards were made in Fiscal Year 1993.

What are the results of these NSF initiatives to date?

- At the precollege level, the Comprehensive Regional Centers and a similar program, Partnerships for Minority Student Achievement, are serving over 80,000 minority students by their activities. In fact, one of the centers recently received the Anderson Award from the American Council on Education's Business—Higher Education Forum for its distinguished achievements. These students are logically and effectively progressing from middle school to high school graduation with the necessary preparation in science and mathematics.
- The aforementioned undergraduate program has more than 10,000 minority undergraduate participants. In fact, remarkably, even after one year of effort, the initial six AMP awardees have exceeded both their enrollment and their graduation goals. Within the individual disciplines, the students are distributed as follows:
  Biology – 20%
  Chemistry – 18%
  Computer Science – 6%
  Mathematics – 6%
  Physics – 22%
  Engineering – 18%

Thus, even with modest retention rates, the number of minority Bachelor's degree recipients should increase from approximately 14,000 to at least 25,000 by the close of academic year 1995–1996.

The second group of NSF initiatives, while clearly on a more modest scale, includes a similar middle school through undergraduate level mathematics and science education program for women and girls and expansions in the programs that address the needs of students with disabilities. Our overall objective is to achieve a balanced series of programs for three affected underrepresented groups by Fiscal Year 1994.

NSF has decided that resource acquisition or programming must effect the transition from programs, per se, to results. We must accommodate this literal and profound change in the basic paradigm. This accommodation acknowledges the shift from inadequate, insufficient, and perhaps even ill-defined objectives to an emphasis on documentable measures of progress toward the achievement of specific goals for programs of appropriate scope and scale. In these efforts, we are responding to the challenges of the present and future in a manner that entails a quite fundamentally different order of resourcefulness and productivity expectations.

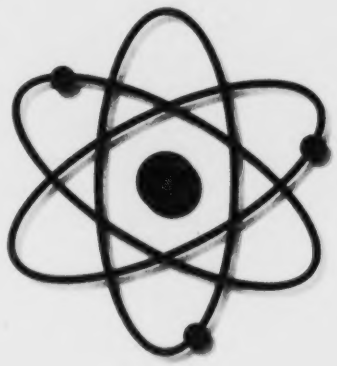
Through our programming, we seek to disallow less purposeful, less connected, and "entrepreneurial at the margin" activities that only reinvent the status quo. Rather, we seek to contribute to the production of contemporary, agile, and competitive workers (problem solvers) through the kindergarten to undergraduate continuum, while we are consistent with demands for greater yields, program monitoring, and evaluation that will provide greater accountability. This conference focusing on the establishment and utility of student databases is an integral component of this overall problem-solving exercise.

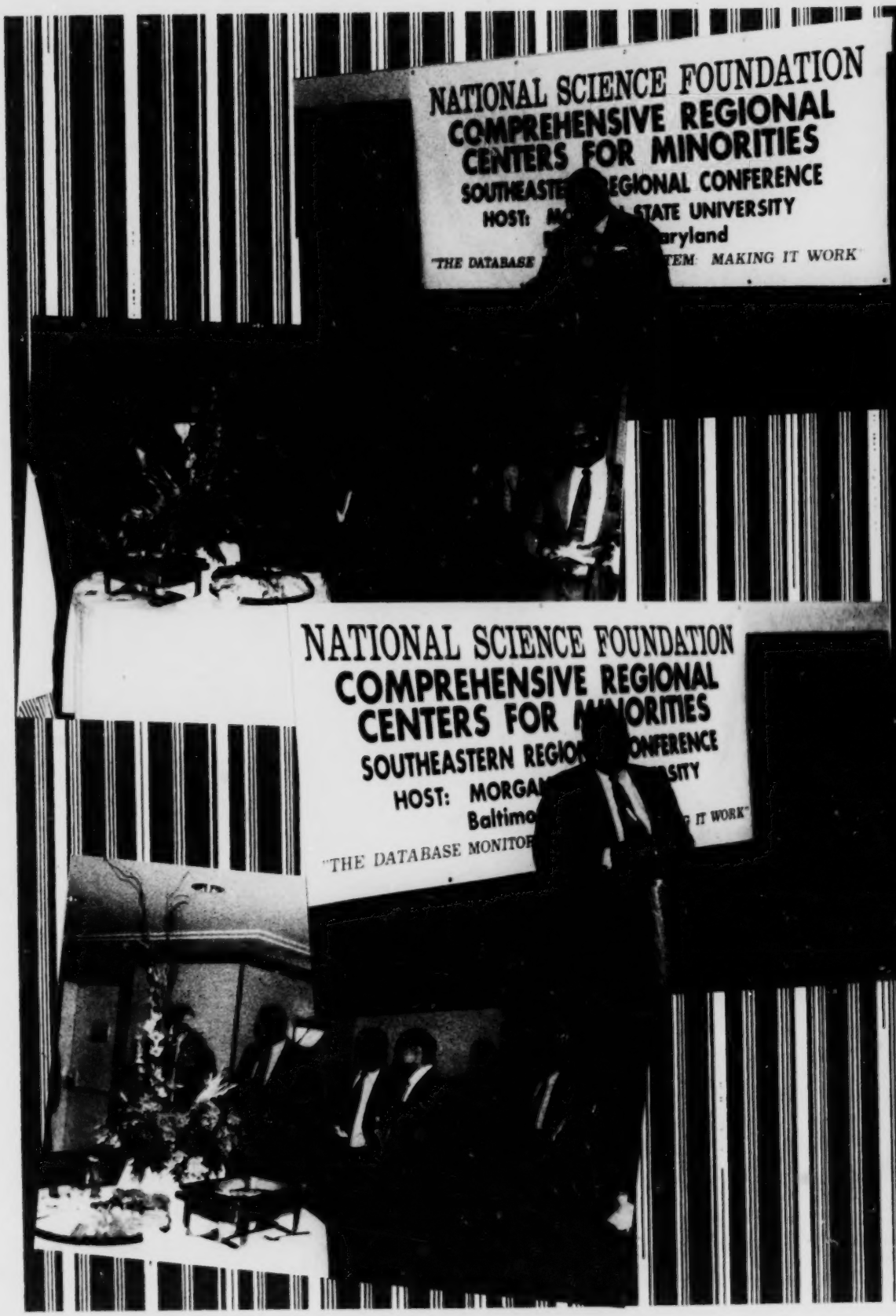
Let me close by recalling the words of one of our great educators, Benjamin Mays, the President of Morehouse College in Atlanta for several decades, "The tragedy of life does not lie in not reaching your goals, but having no goals to reach. Not failure, but low aim is sin."

We elect a new paradigm for making goals and reaching goals together. When the media focuses so much on the pathology and not the progress of minority communities, it is often difficult for minority youths to transform despair into hope, but they must, and CRCM must serve as an effective vehicle for that transformation.

We scholars must break rank with modest goals and effectively challenge that assorted collection of anthropological, sociological, and psychological academic paraphernalia that bespeaks of something other than excellence of ethnic and racial minorities in science and mathematics.

Gil Scott-Heron, a new age philosopher, said it best: "The revolution will not be televised. People of color from all walks of life, sharply focused and with all deliberate speed empowering ourselves — empowering ourselves with science and mathematics — this is a revolution."





Eastern Reception and Dinner Session

GREETINGS AND WELCOME

EUGENE M. DELOATCH
Dean, School of Engineering,
Morgan State University
CRCM Principal Investigator

I recently read a book entitled *Science: The Endless Frontier,* written by Vannevar Bush in 1945. It is interesting that, here we are in 1993, wrestling with issues that have been wrestled with and talked about over the years—the issue of who should receive a quality college education. If you understood the level of achievement and accomplishment of the average person in this country in science, mathematics, and engineering back in 1945, you would know that some leaders in science and engineering have come a long way. We still have a strong segment of our population that is just as talented, just as capable, but are denied access in many ways.

This is what I was talking about today when I said people should get a historical perspective of our professions. One of the best free access libraries in this country is the National Science Foundation. This book by Vannevar Bush is available free of charge at the National Science Foundation. I suggest that all of us involved with the CRCM endeavors should read that text.

At this point, I want to introduce Dr. Jay Chunn, Associate Vice President for Academic Affairs at Morgan State University. You have been greeted, greeted, and greeted, but Dr. Chunn is a different individual. We are happy to have him with us today, and I would like for him to come before you at this time.

JAY CARRINGTON CHUNN
Associate Vice President for
Academic Affairs
Morgan State University

Thank you, Dean DeLoatch. Good evening.

It is indeed a pleasure to be here with you this evening for this dinner. The Regional Conference, dealing with the whole question of science education for our youth, is a very critical conference for us. As the Dean just pointed out, our population was not even envisioned in 1945 as being viable for science careers. Now, by 1999, as well as by the year 2015, we will be about two-thirds of the workforce. So, the glass ceiling for African Americans, for people of color, and for women will disappear.

It is not because of anyone's good graces or love for us, but because of the necessity of our contributions to the world as well as to humankind. Our national defense, our national security, our global competitiveness in the global marketplace will make it mandatory that our youngsters be well prepared, that our high school and junior high and elementary school youngsters all have access to the sciences.

Morgan State is very proud to be a part of this conference and very proud to be a part of this endeavor with the National Science Foundation. We are very proud to be a partner to Baltimore City's Public Schools and the superintendent here with us this evening. We indeed have a very excellent superintendent. We have a school system that is on the move. We have youngsters, teachers, and principals who are invigorated and are taking the challenge that has been laid out for us. We are very proud that the university is in partnership with the public schools in science, mathematics, and engineering preparation for those young people who will move forward in their college or university education.

President Richardson spoke to you this morning. I am sure that, as always, he greeted you and welcomed you here since Morgan is a host of this regional conference. I can only echo his enthusiasm for having you here. Dr. Adams, Vice President of Academic Affairs at Morgan State, also asked me to extend her greetings. Our students, our faculty, our board of regents, and all of us are so pleased that you are here and that we are moving forward.

Our school of engineering is named, as you know, the Clarence Mitchell, Jr. School of Engineering. Those of you who knew Clarence Mitchell knew that he was a Maryland state senator. He served as a lobbyist for having the school of engineering project here in Maryland. He lobbied for the money, as well as for the permission of the state, to open a school of engineering at Morgan State. So, this project has special emphasis because of his legacy. His wish was to see African Americans and young people of color move forward in science and engineering careers. So, the school is dedicated in his honor.

This project is a part of that legacy. This project is a part of the future that he saw for us. This project, then, is moving forward with your great help, with the National Science Foundation and all of you with your skills and your talents as well as your devotion to the task.

INTRODUCTION

EDMONIA YATES
Director of SEMPREP Program

Thank you very much, Dr. DeLoatch. I am sure he has another job for me. It is my pleasure to say good evening, and I hope that you have enjoyed your stay thus far in Baltimore City. We call it "charm city," and I hope you have found it to be just that.

I have the honor tonight of introducing our superintendent, and I say our superintendent, because he works for the children of Baltimore City 24 hours a day. I told him as he came in that I am not going to take a lot of time talking about all the good things that he does and giving a lot of background, because we put his bio on the program. Then the Baltimore Sun was nice enough to summarize all of the things that I wanted to say. When the Sun can say nice things about you, you must be doing something right.

> *"I think it is important as a backdrop, as we try to stay in touch with the purpose of what we are doing, why we are doing it, and what our part is in the educational enterprise, that we should stop and reflect on our mission."*
>
> WALTER G. AMPREY
> *Superintendent,*
> *Baltimore City Public Schools*

Dr. Amprey is a Baltimore City graduate, and I say that because somebody asked me what is the difference between Baltimore City and Baltimore County. They are two separate school systems. He graduated from the Baltimore City School System and Morgan State University. I like the fact that he prepared to be a teacher. He received a Master's in his teaching field. When he decided that he was going into administration, he prepared himself for that. He completed a Master's in administration and supervision and also a Doctorate.

We were fortunate enough to have him for several years in Baltimore City. Then Baltimore County did what they usually do. They find our brightest and our best, and they borrow them. He stayed in Baltimore County for 18 years, learned everything he could, and then our prodigal son came home in 1991, came home as the superintendent. He had moved from vice principal in the county to associate superintendent. We were fortunate enough to have him come back to us.

He has done an excellent job, leading a system that needed his kind of leadership at the time that he came. Most recently, he had the opportunity to leave us. We prayed, we begged, and he listened. I will not say anymore about that, but, you know, he is a wise man. He did not leave the place where people loved him, where children loved him. We are delighted that he is going to continue where he started.

Ladies and gentlemen, you have the pleasure tonight of listening to someone who is interested in children, someone who has pledged to make the City of Baltimore's School System what it used to be. You know we used to be the flagship of the state.

I am sure that, if you give him enough time, it is going to be a flagship of the state again. Ladies and gentlemen, Dr. Walter G. Amprey.

KEYNOTE ADDRESS

WALTER G. AMPREY
Superintendent,
Baltimore City Public Schools

Dr. Yates, you are right. I am certainly a wise man. Why would I go to New York, where no one could introduce you like this?

I do a lot of speaking, but I have never had an introduction like that before. I would like to send Dr. Yates around in front of me saying, "He is coming, folks. He is coming!" I am happy and honored to be here. I want to thank you for including me as part of your regional conference.

I always try to get the information I share from what is going on around me, and I will tell you a little bit about that as I get into my talk. All the ingredients that we need for success, all that we need to make a substantive, positive, long-lasting difference—it is simply a matter of us having the vision and understanding to do that. I wanted to use my talk today to share some of that with you.

I want to commend you for what you do with regard to focusing on the education of minority youngsters. There is nothing more important, believe me, than focusing on making a difference for minority youngsters. There is no other greater cause than what you are doing now. If we do not do a better job of focusing on these young people, we will not only lose what will happen for them and lose them, but we will lose our own futures as well. I think that is how critical times are. I think that is how difficult and awesome the challenge is that we have in front of us.

I know that you believe that all youngsters can learn at high levels and that it is a matter of exposing them and creating the environment and the high expectations for them to do that. I know that we in Baltimore City

are the beneficiaries of a lot of this, as are other schools and youngsters around the country.

I want, if nothing else transpires from my talking with you, to convey to you how important I think that is and, representing the children of Baltimore, how appreciative I am. On their behalf, I appreciate what you are doing and what will happen to them.

I want to share with you some things that are going on in Baltimore and to say them in terms that are certainly not scientific, but are ordered and exact, and that carry with them the cadence that shows a positive direction and a direction in which we need to go.

It is important in all that you are doing, whenever you get into issues around the database issues you are studying today or other aspects of the mechanics and the operation of the database, that you should never lose touch with the true purpose of what the program is all about. That is, providing for young people control over their destiny and a fulfilled, happy life that contributes to the world society.

I think it is important as a backdrop, as we try to stay in touch with the purpose of what we are doing, why we are doing it, and what our part is in the educational enterprise, that we should stop and reflect on our mission. We should sit back and sharpen our axes and see how we connect with what it is that we are supposed to do. Now, with that as a backdrop, let me talk with you a little bit about my city and the school system and see if you can relate to the mission and the overall goal and the purpose.

Some statistics—We have a generation of people, particularly African Americans and, more specifically, African-American males, who are lost. As a matter of fact, for the first time, we will probably have a generation of Americans who will do worse than the generation that preceded them. It has always been the opposite, but we are now at the precipice of a generation of Americans who will do worse than their parents.

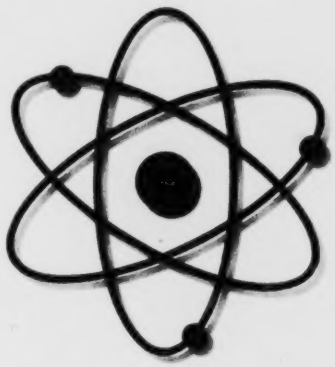
More statistics—Of all current prisoners, people who are incarcerated, 82 percent are either uneducated or undereducated, meaning that they have not completed a high school education. Now, if you imagine that the 82 percent is 100 percent just for a second, 73 percent of those people incarcerated are African Americans.

The latest figures I have is that the cost to taxpayers to incarcerate those people each year is on the average of about $20,000 a year. On an average, the cost to the taxpayers to get a Head Start program going is about $3,500 a year. The last time I checked, the average taxpayer contributes to about $5,000 a year for a government-supported institution in education. What is the point I am making with these statistics?

We can incarcerate, or we can educate. If we get them early and invest small amounts of money, the good grows exponentially. If we do not, it is economically unfeasible and untenable, and the bad grows exponentially. Now, how is that for science from a guy who had goose bumps raise up on his arms when you even mention fractions?

The landscape in our society has changed. It demonstrates that we are in very serious trouble. We have lost the ability to inculcate and instill values in our young people, the new generation of citizens who will come forward. The kind of values that have been the bulwark and anchor for our society seem to have disappeared. As you think about those points I gave you as a backdrop, let us think about something else scientific.

If you were to scratch your finger or cut yourself shaving, your body automatically begins to send all of its healing resources to the point of the infection. It arrests its normal duties. Sometimes you do not even know it. If it is a serious enough cut or injury you go into shock, because the entire body sends all of its resources to the point of the problem, knowing that if it does not solve that problem, there will be a demise of the entire body. That is done automatically and naturally.



We are at a point now where we must use all of our resources to save our future, these young people. That is why I am so committed. That is why I am so focused. That is why I will let nothing get in the way of helping these youngsters, not so much because it is the right thing to do and a job to do, although that is reason enough, but because I know we are all beginning to learn that we are not going to have a future unless we begin to give more people a greater control over their destiny. We cannot live far enough away; we cannot develop enough electronic devices to protect us from this growing sea of people who are not owners of a part of the dream.

Unless we take upon ourselves the responsibility of giving them that, we in turn will lose the ability to have our own dreams for our posterity. What the divine intelligence has given us is an ultimatum. Since we have failed to do this because it was the right thing to do, we must now do it because it is self-saving. We have no choice. That is why there is nothing more important in which you can invest your time or your energy.

Our government is now recognizing very clearly that it must begin to look at things differently. I think that is what we are doing in this city. I think we might have a bit of a jump on them, but that is not important as long as we can save young people.

Let me talk a little bit about what we are doing specifically in the city. Since 1991, there is something we call a pathway to excellence. The idea is to bring people together to try and unify our efforts. We did several things.

We started off by recognizing—when I say we, I mean that I was appointed as superintendent at the same time two other people were appointed as deputies. At that point, I made a decision that, whatever the collection of people would be, we would make it work. It has not always been easy, but we have done that. We have decided that we would make it work, and together we made a pact about how we were going to approach this.

We would not announce our presence by automatically reorganizing the school system, but begin to use the scientific method to try and determine how urban problems display themselves in Baltimore. All of us understand urban education and are credentialed in it. We also recognized, however, that in each situation these problems display themselves differently. Although I had been in this area for all of my life, certainly all of my adult years, it would have been a very serious and egregious mistake to assume that I had the answers before I had even asked the questions. We began quickly to study the system to try and determine what needed to be done. We came to certain conclusions.

One is that our current beliefs about education were a part of the problem. These were not bad people, but a faulty belief system; not lazy people, but bad processes; not recalcitrant people, but people who had been demoralized by policies that are inappropriate, that had been developed over the past two and a half decades. People were asking what it is we need to do to solve the problem, instead of asking what is it we need to understand. What is it we need to understand about young people today, how they learn, how they think? What has happened with their values? What is the background from which they come, and how does this display itself in the classroom? Are we trying to do something that looks good for us as teachers and as students in a system where the rules have changed?

You have to understand and we have to understand what motivates people today. That causes us to have to go out of ourselves. It means that educational reform must start with the reform of how we think. We fail or refuse to change how we think by wanting to change what we do. Nothing we do will work until we change how we think, because we are simply doing different things that are spinoffs from the same way we think. So, we are spending more money on education, spending more energy and time, and getting less results.

We need a vision. Vision is the ability and willingness to look beyond today. End of definition; that is vision. It can be categorized in many ways, but our entire society is guilty of a lack of vision. We have not looked down the road. We are all dealing with the immediate. If I can just get through today. If I can just get through this week. If I can just make it to the weekend. Not many people, as we clear the forests, are climbing up to the trees and saying, hey, wait a minute, folks. Wrong forest.

That is why I, as the superintendent, talk to many groups of people and organizations and everyone else who wants to tell me how to run the school system, because that must be all pulled together. If not, we will make no progress.

I was fortunate enough, for the first time, to meet Luther Williams in a suite upstairs. There is a man who is climbing the tree and looking down the road. I will never be the same after talking with him. I was with him only for about an hour or an hour and a half. He recognizes that the history of the grant system in this country has a lot of people just doing things without understanding how it ties in to a systemic whole. When he finished talking I told him that that is what I am trying to do with this school system.

The point that I am trying to make is that we have to pull this together and I need some help with looking down the road. We have to understand that it is our approach, philosophically and in our minds, that must change. We must recognize that we must all be committed to making this difference. We do not have time to squabble over turf issues and adult problems while our young people, our very future, our very life, our very passport to the 21st century, slide down these gutters into the sewers. We cannot afford it. We must find ways to systemically work together. We have no choice.

Many incarcerated people here in the Baltimore City Jail or in the Maryland Detention Center are brilliant people, capable of learning the very same things that you are trying to teach to young people in the SEMPREP programs. The environment in which they learn and what they learn cause them to learn things that are antisocial, destructive, and self-destructive, and which caused brilliant people

to be put away and will probably put them on a track that will keep them for the rest of their lives in that mode, unless they get the proper nurturing.

All children have gifts and talents. We accept the challenges of identifying them and nurturing them. That is what I believe. I think that all the ingredients we need to sustain and be successful in life are already here. They were placed here before we got here. Our job is to teach ourselves and others how to tap into this reservoir.

We should give standardized tests all the time. Tests that determine early in life how people learn best. Are they kinesthetic? Are they visual learners? Are they auditory learners? Find out how they learn naturally, and then get out of their way. Give them all that kind of stuff that is their learning modality, and they will go much faster than we can ever, ever help them. All you have to do is watch it.

We have developed in Baltimore a philosophical vision that is just as I explained to you. We must create a climate that is fertile for learning. We must all believe in it and engage in it. Going into our third year, we are still espousing that philosophical vision. That philosophical vision evolved into what we called the kinetic vision. These were terms that we just kind of made up to have people understand how we work together and how we tie into it.

We must see our children and intelligence differently. If there is anything I could make you do, I would make you say that over and over again from the time you get up until the time you go to bed. "I must see intelligence differently." Intelligence is not fixed in stone. Some people are not born with it and some people born without it. That is the biggest lie that standardized testing has taught us for three generations. It is not only a big lie, it is not only dehumanizing, it is tragic.

Intelligence is like a muscle. It can be developed. And we are living proof that it can be developed. I know I am. I was told I could never get a doctorate. But someone cared about me and wanted me to know where to begin. That person told me I could be whatever I wanted to be. I am grateful to that special person.

There is nothing that these kids cannot do, and they will come to you when you tell them that. When you tell them they are beautiful, they are bright, and they are smart, and you tell them early—they will believe you. You can tell them what we tell them in Baltimore—that smart is not something you just are, smart is something you can become if you believe you can and work hard.

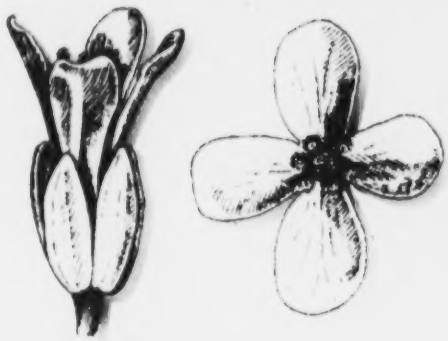
I appreciate what you are doing. We are saving the children and saving the people. You could do a lot more, if you had a little more help and more resources. If we do not give more people control over their destiny, we are going to lose the ability to have control over our own.

Thank you all very much.

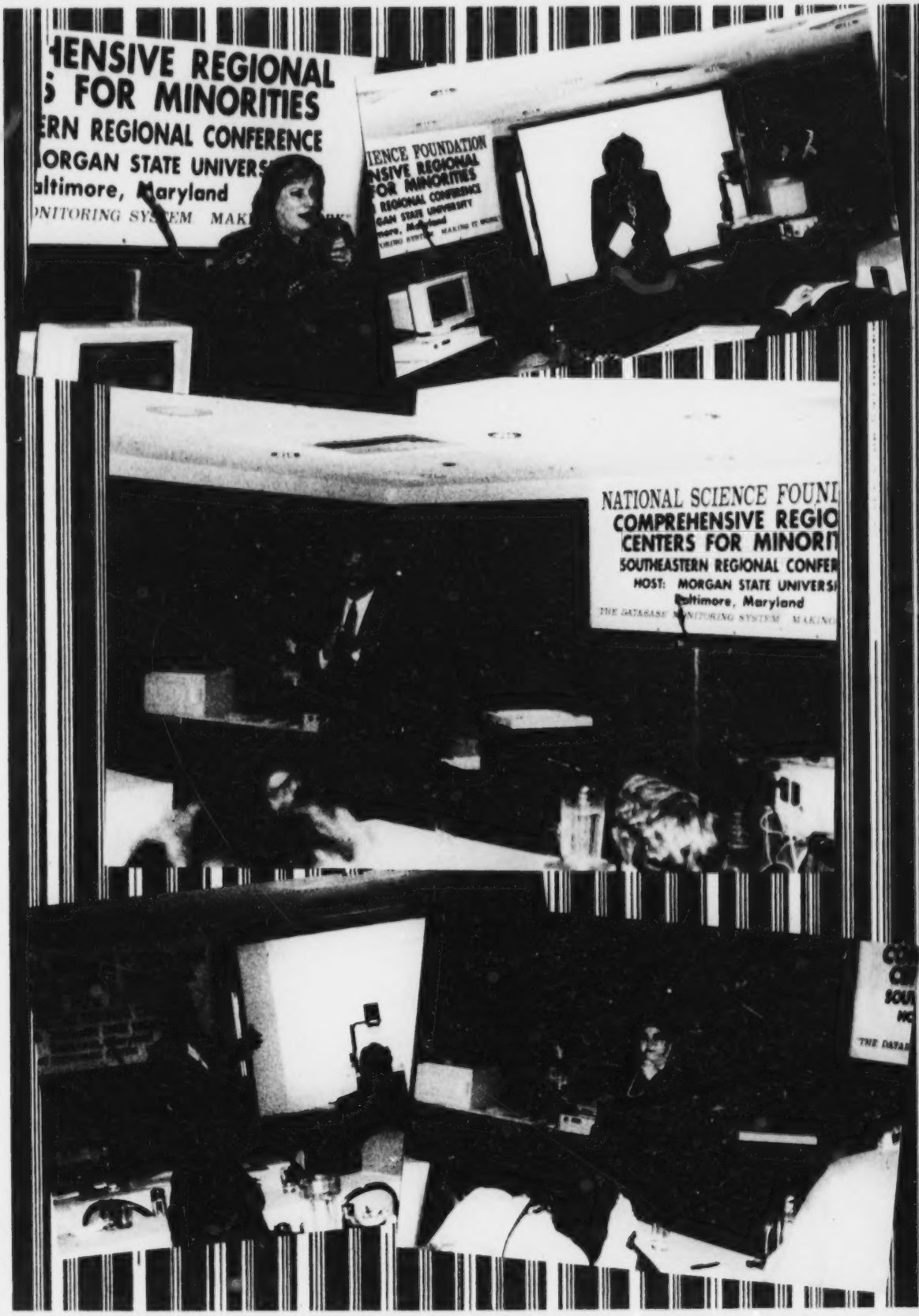
AWARD PRESENTATION

EDMONIA YATES: Dr. Amprey has said repeatedly that we need all the help that we can get, not only in Baltimore City, but as I look at what is happening all over the country, I can see that we have to put our forces together. I know that we are about the business, Dr. Amprey, of getting these students in the pipeline of science and engineering. We also must, of course, get them in line with the communication of others, too.

Dr. Amprey has not left any stone unturned. He is working in all the areas. He works days, and he works nights. You know he is



there. He will call you back, if he is not there. And we want to say to you that we appreciate all that you do, and we want you to have this little memento of our love and appreciation, which says: "Presented to Dr. Walter G. Amprey, for the outstanding service as Superintendent of the Baltimore City Public Schools." This comes from the National Science Foundation, the Comprehensive Regional Centers of Minorities, the Eastern Regional Conference, Morgan State University, October 2, 1993. Thank you, and good luck.



Eastern Closing Plenary Session

SPECIAL ADDRESS INTRODUCTION

EDMONIA YATES
SEMPREP Project Director

We in Baltimore City collaborate on everything that we do. We are very fortunate to have a Mayor who is sincere about education, and our association with him goes back a long way. When I was a principal, he always came to the school to motivate our young people and to give whatever assistance that he could.

When he became the Mayor, he came into the office saying that he was going to improve education in Baltimore City. And I am here to tell you that he has done that.

I want you to know, Mr. Mayor, that we have people here from eight different states who are all working for the same purpose: to improve and increase the number of students going into mathematics, science, and engineering. The conference is sponsored by the National Science Foundation, and we are working specifically on underrepresented minorities.

In Baltimore, you know we have the Comprehensive Regional Center. We were awarded up to $5 million over a five-year period. We have just completed the first year, and there are many positive things that have happened that we would like to share with you some other time. I think you know what they are.

The Mayor keeps up with what is happening in education. I would like to introduce you to every person in here, but we do not have that kind of time. You met these two gentlemen, Dr. DeLoatch and Dr. Calbert. We have participants from the states of Florida, Mississippi, Missouri, Pennsylvania, Massachusetts, Ohio, Illinois, and, of course, the city of Baltimore. You can see the interest that these people have; they have stayed over and worked on strategies that will increase the number of minority students going into mathematics and science.

Also, let me thank you, Mr. Mayor, for taking time from a busy schedule to prove to these people what we have been saying, that there is no other Mayor in the United States who is more supportive.

SPECIAL ADDRESS

THE HONORABLE KURT SCHMOKE
Mayor, City of Baltimore

Thank you very much, Dr. Yates. Good morning, ladies and gentlemen. It really is a pleasure to join you. I will not be very long. Dr. Yates is correct. When I came into office, I said that of all the things I could hope to accomplish was if one could simply say of Baltimore, this is the city that reads. And the reason for that is we recognize that we have to improve levels of literacy for all of our students to meet the demands of the late 1990's and the next century.

As you may know, the largest private employer in our community about 25 years ago was the Bethlehem Steel Corporation's Sparrows Point plant. Today, the largest private employer in Baltimore is Johns Hopkins University and Health Center. It is a whole different employment mix, and we are looking to the future with some optimism, as we have an economy that is based on brain power, not muscle power. All around you, you will see the signs of that.

If you go down next to the National Aquarium, you will see the new Columbus Center of Marine Research and Exploration. The Columbus Center is going to make Baltimore to the field of marine biology what Cape Canaveral is to the space program. It really is very exciting for us, and there are many other similar developments throughout the city and the state.

We work in partnership, not only with Morgan State University and Towson State University, but also with other universities and colleges in the area. They have been remarkable in their commitment to our young people in the high schools, and even in the middle schools. They have raised the students' vision. They have set the sights very high for our young people, and they are going in with the attitude that, if we set the goals high, the young people will work up to it, rather than believing that students can achieve only a certain minimum level of competence.

So we are excited. We are excited about the partnership with the National Science Foundation. I have had a number of opportunities to meet several NSF people over the past few years. Everyone in our community is involved in our efforts, including our U.S. Senators, the Governor, all the elected officials, and, of course, those involved with higher education.

We believe very strongly in that frequently cited African proverb that "it takes the whole village to raise a child." We do believe in our city, and if you go into our public schools, you will see that we have comprehensive programs, not only in mathematics and science, but also in health areas and recreation. We try to make the public schools the pivotal institution of the neighbor-

hood, and so we have many different activities for adults and our young people into those buildings, and that is our goal.

I am really excited about increasing the number of students in mathematics and science. Dr. Yates was not very kind to tell you that I did not go to our mathematics—science school here in Baltimore, and, as far as that is concerned, I guess I am a cultural peon in mathematics and science. But I understand it is important and is opening up really new avenues for our young people.

I was a little disappointed last year to see that the number of African Americans receiving Ph.D.'s in mathematics and science did not increase. It has kind of leveled out, and I think possibly even dipped slightly. With these types of efforts, not only at the university level, but in our high schools and middle schools, I think that will change. We will get young people into the pipeline; we will see them as mathematics professors and as scientists; and we will see them in a broad range of professions that involve an expertise in mathematics and science. That will be very rewarding.

I would also be remiss in my duties as Mayor, if I did not encourage you to spend a lot of money while you are here in the city. I want you to enjoy yourselves. I know you are going to have an educational and intellectually stimulating experience. There are a lot of good things going on in our community. I do hope that you have a wonderful time and that you come back to our city, either individually or collectively in the future. I appreciate your commitment to use mathematics and science to motivate our young people and particularly to lead to a brighter future for all.

Thank you very much.

"We are excited about the partnership with the National Science Foundation. I have had a number of opportunities to meet several NSF people over the past few years. Everyone in our community is involved in our efforts, including our U.S. Senators, the Governor, all the elected officials, and, of course, those involved with higher education.

We believe very strongly in that frequently cited African proverb that 'it takes the whole village to raise a child.'"

THE HONORABLE
KURT SCHMOKE
Mayor, City of Baltimore

REMARKS

SHEILA COLEMAN
Principal,
Baltimore City Public Schools

Good morning. If I could say in one hyphenated word as to what my feelings are about this SEMPREP Algebra Project, that word would be "self-esteem." We all know what happens if we raise the self-esteem of youngsters, and that is what algebra did for our youngsters.

I cannot tell you in a couple of minutes how important it was for us to enter this partnership with Morgan State University and SEMPREP. They gave us the impetus. They kept us going when things seemed low. The end result was that our children's self-esteem was raised. Our children realized that they could do algebra. Algebra is not something foreign and above their abilities. Algebra is doable; algebra makes other doors open up to them.

I have to give credit to the Algebra Project in part for raising our grades in other subjects. It had a carryover effect. Because the children could do the algebra, they said to themselves at the beginning, "This is hard, but I can do it." The teachers confirmed that. They began to realize some success—and there was a great deal of support in this. Morgan State University students came in as tutors, and they met one-on-one or one with two or three students and gave that necessary extra support.

The students also received extra support from their teachers. Every student had an algebra textbook; every one of them had a parent who knew what he or she was doing; every one of them knew that the teacher was going to make it interesting and different, but doable, and that doable was the key to it. When they went to other classes, they believed that they could do what was expected of them.

The Algebra Project had a lot of other effects in our school and with our eighth graders. Our eighth graders last year—and we do not have the comparative data—had more honor roll students, received more graduation awards, and increased their attendance over the year before. Usually, the sixth graders have the highest attendance rates in middle schools. In our school, the eighth graders became the class with the highest attendance rate.

We cannot measure how much of this was due to algebra, but I can tell you, because I was at that school for five years prior to this project, that algebra had a tremendous impact on our students. So I am here this morning to give testimony to that and publicly say once again, thank you, Dr. Yates. Thank you, friends at Morgan State University for making it possible for our students to do better.

It will be interesting to see how our children do in high school mathematics courses. Our children are ready for Algebra II. We do not know how many of them have been accepted into Algebra II or Geometry, but our children should be able to finish a Calculus or Trigonometry course before they graduate from high school. And we all know what kind of doors that will open.

Thank you.

FUTURE DIRECTIONS FOR THE DATABASE MONITORING SYSTEMS AT THE NATIONAL SCIENCE FOUNDATION

SUSAN GROSS
Program Director,
Division of Research,
Evaluation and Dissemination
National Science Foundation

One of our major commitments as a division is to the overall database effort that is taking place in the EHR Directorate. We have invested a lot of staff time as well as financial resources to develop the database. Mr. Carlos Reyes is here as part of that effort.

We have a major contract with ABT Associates and Quantum Research Corporation (QRC) as a subcontract to ABT. Mr. Reyes is with Quantum Research. Their major function is to develop and support us in database functions.

This overhead that I have put up is a description of the general structure of the overall EHR database activities. In the green section, we have the EHR Directorate. We have built the database to have three strands, if you will. Data that span across all programs in the directorate would fall in the green box. Data that might apply to a specific division within the directorate would fall in the blue box. And then there are data particular to a specific program within a division, such as CRCM.

At the EHR Directorate level, we would have information about your PIs and project directors, because that spans all awards that we make, institutional information, information about abstracts, and information about participants who you plan on serving.

At the HRD Divisional level, we would have information that would relate to retention of minority students in the SEM pipeline, or movement through the pipeline, or numbers of students that were graduating with SEM degrees. As we come to the program level, we have information similar to what you will submit this coming December and that you submitted last year on the CRCM MOS. For instance, information about your projects, your activities, your participants, and the like.

We have similar activities going on in the AMP program. We have what we call a monitoring and reporting system, or MARS, that AMP PIs are submitting to us from all of the institutions that are in their AMP alliance.

Each of the divisions within EHR, for example, the Undergraduate Education Division, has similar program-level databases that would come over here in the yellow section, and so does GERD, the Graduate Education and Research Division.

So, the MOS that you are working on becomes a very important part of this overall database effort. It is the individual program information that enables us to aggregate and describe what is happening throughout the EHR Directorate in terms of programmatic impact—where we are spending our money and what we are getting for those expenditures.

> *"I cannot tell you in a couple of minutes how important it was for us to enter this partnership with Morgan State University and SEMPREP. They gave us the impetus. They kept us going when things seemed low. The end result was that our children's self-esteem was raised."*
>
> SHEILA COLEMAN
> *Principal,*
> *Baltimore City Public Schools*

This is just an illustration of how we are setting up the database. In the green section are existing data we have on our mainframes within NSF, information about proposals and awards, financial award data, PI information, institutional information, and the abstracts. What Carlos and his colleagues at QRC and ABT are helping us develop is the impact side of the database. We are doing this on our own server. Right now, we have a 486 server. We hope to move up to a 586.

We are building the quantitative part of the database, which includes the MOS data, the annual reports, etc. We are hoping in the next year or so to move to qualitative data that also will help describe program impacts. As you will hear Dr. Stevens say in a few minutes, it is the qualitative information that really enriches the quantitative information. So, not only will we know who are we serving, but we will also know how are we serving them, why are we doing what we are doing, and how it all fits together into a nice picture.

It was interesting to me to notice that, among the student activities, the majority were enrichment and subject matter improvement. There were variations across the sites in terms of

emphasis, but, in fact, practically 85 percent of the activities overall as reported to us were either enrichment or subject matter improvement.

Among the teachers, it is not surprising that the overwhelming majority of the activities were curriculum development, instructional methods, and improved content knowledge. Those really are the focus of CRCM.

> *"The MOS that you are working on becomes a very important part of this overall database effort. It is the individual program information that enables us to aggregate and describe what is happening throughout the EHR Directorate in terms of programmatic impact—where we are spending our money and what we are getting for those expenditures."*
>
> — SUSAN GROSS
> *Program Director, Division of Research, Evaluation and Dissemination*
> *National Science Foundation*

I found it very positive to see how much emphasis is being placed at the middle school level by all of you, because I feel that middle school is probably the first place where the gate closes on some students, with the gatekeeping courses of pre-algebra and algebra. I believe it is quite encouraging to see that, overall, 41 percent of the programs are focused at the middle school level.

By the way, just as an interesting aside, the number of program activities that you all have varies tremendously. I just found it interesting that the range and number of student programs went from 6 to 43 and the range in teacher programs went from 2 to 20. I do not know what it means, but I found it interesting that there was that diversity.

I want to remind all of you of what we said yesterday about participants and how you count them. The participant is the person who is getting the direct services. If you are providing direct services to teachers and are assuming that the students are going to benefit because the teacher then takes something back to the classroom, those students are not participants. So, you should have in your participant columns for teacher activities, predominantly teachers, and for student activities, predominantly students.

I think one example of when you might have a mix of students and teachers is if you run a special program where the teachers are getting in-service while at the same time they are teaching the students something. So, everybody is participating. That would be an example of both of them being participants.

As an example, this is a student summary table. It indicates that 5000 students were supposedly participants in a teachers' instructional methods program. I am saying that is a red flag. That number says to me that somebody is misinterpreting.

I am encouraged that we have so many girls who are participating. I think that is really great. Let me just see if I can find some other points of interest here for you. You will be able to take these back and look at them at your leisure.

The database also shows the number of students who were interested in mathematics and science teaching. I am really hoping that a lot of those unknowns are going to move up into "yes." I see that as one of our missions in programs of this type, to serve as mentors and role models for the kids. I am concerned, when I see

a number like 5 percent who say that they want to be teachers, that we are not replacing ourselves with folks who are going to have the quality we want to raise the next generation.

I know that these kids are young and have not made up their minds yet, but I see it as our role to foster the interest in continuing the profession along.

You will also see the inverse of what I was talking about before with the students. Table 14 is the number of teachers by program type and delivery mode. We have 1330 teachers in enrichment activities, and enrichment is supposed to be a student activity.

So, you have your own data. Not every center mixed them up. You will be able to see from your own data whether you have something you need to sort out within your site or not. If it is a truly combined student—teacher activity, do not worry about it. But if, in fact, it was a misinterpretation that someone had at one of the schools in your center, you might want to catch them up on this.

The last table I want to comment on is on page 9, and it is the description of participants table and the range of students and schools that we have participating. I just found this interesting as well.

Clearly, we have programs more limited in focus and targeted on specific schools, maybe in a more intensive way, than others that are doing a broad brush. The range in the number of participating schools across all the CRCM centers was from 17 to

290. It really describes the diversity of what is going on in the CRCM program.

One final word—The minority course enrollment; now that some of you see it, maybe you will be able to gather the data for us. Not too many centers were able to provide these data last year. We are hoping that as time goes on, we will be able to fill that in better. While we do not want the prealgebra and algebra course to be the be-all and end-all of this process, they are important benchmarks for what is happening in the program.

Before I sit down, I just want to recognize someone who was not here yesterday when the general introductions were made. Ms. Griselio Moranda is part of our staff. She has been working very closely with me in the database activities. She just joined our staff a few months ago. I am really happy to have her as part of our team and I just wanted to recognize her.

FLORALINE STEVENS
Program Director, Research, Evaluation, and Dissemination
National Science Foundation

Dr. Stevens' remarks are detailed in the Second Plenary Session of the Western Regional Conference, pp 97.

CONFERENCE PARTICIPANTS

NSF EASTERN REGIONAL CONFERENCE
October 2-3, 1993

HOST:
MORGAN STATE UNIVERSITY
Baltimore, Maryland

The National Science Foundation

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Dr. Roosevelt Calbert
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Ms. Melva Ware
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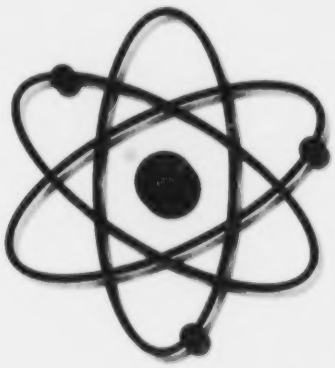
Evaluation and Data Analyst



THE PHILADELPHIA COMPREHENSIVE REGIONAL CENTER FOR MINORITIES

(established 1989)

INSTITUTION
PATHS/PRISM:
THE PHILADELPHIA PARTNERSHIP FOR EDUCATION
PHILADELPHIA, PENNSYLVANIA

PRINCIPAL INVESTIGATOR
STEPHEN R. COX

PROJECT SUMMARY

During 1992–1993, the Philadelphia Comprehensive Regional Center for Minorities (CRCM) entered its fourth year of operation and continued to support and reform mathematics and science education for teachers and students in the Greater Philadelphia Region. Although the CRCM continued to support successful activities regionwide from previous years, in Year IV it focused its efforts on reforming a K–12 cluster of schools. The K–12 cluster contained an elementary, middle, and high school and was based on the school-to-school feeder patterns in the School District of Philadelphia. This modification was made as a test of CRCM activities. The CRCM needed to know whether or not staff development and student enrichment activities which have been successful regionwide would also be successful on a school-based level. In addition, the cluster approach was chosen so that one could maintain the impact of the mathematics and science reform on students through their K–12 experience. Strawberry Mansion Middle/High School, along with its elementary school feeder, L. P. Hill School, was chosen as the K–12 cluster of schools owing to the fact that it had one of the lowest graduation rates in the School District of Philadelphia, it was a comprehensive or average impoverished school, and the elementary, middle, and high school were located in the same building. However, to begin the process, most of the activities of Year IV were focused on the middle/high school. The elementary school will be the focus in Year V.

This change has had phenomenal results. Mathematics and science have been used to reform Strawberry Mansion Middle/High School. As a result of CRCM activity, the graduation rate of the school more than doubled for the 1992–1993 academic year (from 80 students in 1991–1992 to 170 students in 1992–1993), and science fair participation and awards increased tremendously (making the school comparable with the magnet high schools in the region.) Interdisciplinary approaches to teaching mathematics and science were incorporated in the education process. In addition, effective Fall 1993, all students will be required to take four years of college preparatory mathematics and science as a graduation requirement. The K–12 cluster model has been very successful.

Regionwide efforts were also very successful. Enrollment in Algebra I at the seventh- and eighth-grade levels continued to increase with a 90-percent rate of completion in the School District of Philadelphia. Ninety-four percent of all CRCM program participants successfully completed all college preparatory mathematics and science courses taken, as defined in the MOS. As a result of the CRCM's participation in the Philadelphia Regional Introduction for Mathematics to Engineering (PRIME) program, approximately 1022 students are now attending four-year colleges and universities (Figure 1). Thirty-eight people received awards, honorable mentions, and/or summer research internships for their participation in local and regional science fairs. In addition, interdisciplinary mathematics and science curricula were incorporated in schools at the secondary level.

PROJECT TESTIMONIALS

"The CRCM has done outstanding work in focusing the attention of the higher education community in the Delaware Valley on the severe problem of the lack of minority presence in programs of science, engineering, and mathematics."

Reverend Edmund Dobbin, President
Villanova University

"We have appreciated the support the CRCM has given the ASPIRA to expand our innovative approach to work directly with the Latino students and their parents within the schools and in a community setting. Our experience these past years with the CRCM has strengthened our belief that it is possible to successfully increase the number of underrepresented minorities in science, mathematics, and engineering. We have been particularly impressed with the types of experiences and opportunities made available to Latino students, who have been traditionally left out of the SEM pipeline."

Emanuel Ortiz, Executive Director
ASPIRA, Inc. of Pennsylvania

"Mathematics and science opportunities had not really been made available to Latino and African-American students. The NSF has been making an impact by going out and actively recruiting and saying to students, 'You can get there.'"

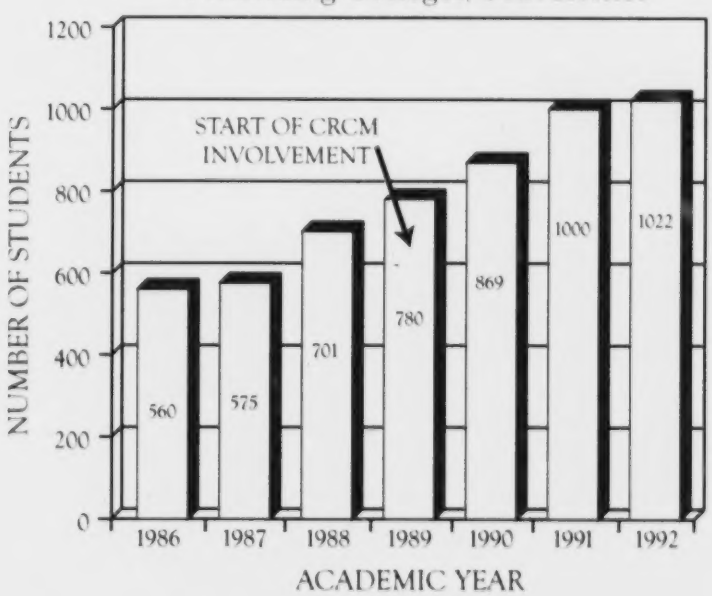
Jose Cabrera, Counselor
Pre-Freshman Bridge Program

"The most powerful influence, for me, under the CRCM in terms of my professional teaching development, has clearly been the QUASAR Program-and its focus on middle school mathematics curriculum and instruction."

Gary Plummer, Teacher
QUASAR Program

Figure 1.

PRIME Graduates Attending Colleges/Universities



GENERAL PROGRAM DATA

Number of Level I Students	2594
Number of Level II Students	5900
Number of Elementary Schools	19
Number of Middle Schools	86
Number of High Schools	147
Number of School Districts	4
Number of Community-Based Organizations Involved	3
Number of Industries Involved	3
Total Number of Precollege Students	15,540
Total Number of Program Activities during the Year	47
Number of Ongoing Activities	47
Number of One-Day Activities	0
Number of Periodic Activities	0

EXEMPLARY PROJECT STRATEGIC PLAN AND OUTCOMES

Philadelphia Algebra Project

The Philadelphia Algebra Project is a collaborative effort between the Philadelphia CRCM, supported by NSF, and the School District of Philadelphia to increase the number of minority students successfully passing Algebra I, the crucial gateway to higher education and careers in science, mathematics, and engineering. The objectives of the project are to strengthen the curriculum and instruction of prealgebra (or transition mathematics) in the seventh and eighth grades; to provide the opportunity of introducing more students to algebra at the eighth-grade level in selected schools; to increase the number of students passing ninth-grade algebra; and to increase the number of students taking higher-level mathematics and science in high school.

During Year I (academic year 1989–1990), 100 middle school

teachers of mathematics (seventh and eighth grade) successfully completed an intensive professional development course using the University of Chicago School Mathematics Project (UCSMP) materials that incorporate the Curriculum and Evaluation Standards for School Mathematics of the National Council of Teachers of Mathematics (NCTM). These graduate courses covered transition mathematics (prealgebra) for 75 elementary certified teachers and Algebra I for 25 secondary mathematics certified teachers. The Philadelphia CRCM provided all teachers with a classroom set of scientific calculators. In addition, the Algebra I teachers received a PC viewer, graphing software, and a computer cart. Computers were provided by the School District of Philadelphia. To reinforce the training that these teachers had received, a "users" group had been established which met monthly for teachers to share and resolve their problems and to report their progress in teaching the new materials.

Through the Philadelphia Schools Collaborative, in the summer following the first sequence of teachers involved in professional development, the teachers taught students participating in the following academic year mathematics program. The teachers at the end of the four-week sequence reported that they were comfortable and reinforced by this experience and believed that the students would be the ultimate beneficiaries of the summer experience.

The Philadelphia Algebra Project has become one of the most effective programs in the CRCM's arsenal of activities. Sixty-four schools participated in the project over a two-year period, which included 59 schools from the School District of Philadelphia. Other school districts participating in the project included Chester Upland, William Penn, and Camden City School District. Seventy-five teachers participated in the project during Year II of the Spring of 1991. Seventy-five more teachers will participate in the professional development activities in the Spring of 1994.

As a result of the project, the Superintendent of the School District of Philadelphia mandated that every school with an eighth grade would have a Algebra I course, owing to the enthusiasm of the teachers in the project. Enrollment in Algebra I at the seventh- and eighth-grade levels also increased from 145 students in 1989–1990 to 3205 students in 1992–1993, with students having a 90% success rate of completion in the School District of Philadelphia. In addition, in grades 9–12, approximately 10,000 more students were enrolled in college preparatory science courses, and approximately 7000 more students were enrolled in college preparatory science course during the 1992–93 academic year than in 1990–91 in the School District of Philadelphia.

In short, the School District of Philadelphia, Philadelphia Algebra Project has resulted in

- The reintroduction of Algebra I at the eighth-grade level district-wide.
- The increased enrollment and successful completion of Algebra I at the seventh- and eighth-grade levels.
- The increased teacher development and instructional effectiveness of the prealgebra and algebra curriculum.
- The movement from general mathematics to algebra at the middle and high school transition at selected schools.
- The increased enrollment and successful completion of students taking higher-level college preparatory mathematics and science courses at the high school level.

The growth of the Philadelphia Algebra Project has spread to the fifth and sixth grades in the development of a pretransition curriculum by the Consortium to support early intervention in the elementary feeder schools. A second growth component has allowed the high schools that are in the upper end of the feeder pattern to take advantage of the Interactive Mathematics Project, an NSF-supported mathematics program that uses thematic problems in a practical applications format which will have an impact on Algebra through Calculus for high school students and teachers.

> *"The CRCM has done outstanding work in focusing the attention of the higher education community in the Delaware Valley on the severe problem of the lack of minority presence in programs of science, engineering, and mathematics."*
>
> REVEREND EDMUND DOBBIN,
> *President*
> *Villanova University*

The Algebra Project has become the DNA of the entire CRCM effort in Philadelphia and has had systemic impact in the School District of Philadelphia. It has also allowed the professional development of the teachers to transcend mathematics and include the cross-disciplinary experiences of science, African-American contributions, and the focus on real world problem solving. The algebra readiness activities are based on the premise that all students can understand and learn algebra. In order for this to occur, students must be actively involved in their learning, and the instruction must address multiple learning styles that lead to effective learning.

THE ST. LOUIS REGIONAL SCIENCE AND TECHNOLOGY AND CAREER ACCESS CENTER

(established 1989)

INSTITUTION
UNIVERSITY OF MISSOURI AT ST. LOUIS, ST. LOUIS, MISSOURI

PRINCIPAL INVESTIGATOR
HARVEST COLLIER

CO-PROJECT DIRECTOR
MELVA WARE

PROJECT SUMMARY

The St. Louis Regional Science and Technology Career Access Center is organized through the cooperation of the University of Missouri at St. Louis, the University of Missouri at Rolla, the St. Louis Community College, Harris Stowe State College, and the St. Louis Public School System. Organized in 1987, this project represents the first consortium of these institutions in St. Louis.

The center's mission is to develop and conduct coordinated schoolbased and external strategies that result in the academic preparation of urban minority students to enter undergraduate studies in the sciences, mathematics, and engineering. During the past four years, the implementation of CRCM activities at the middle and high school levels has provided opportunities for involving students in formal and informal science and mathematics enrichment, inquiry-based learning experiences, career orientation, and scientific research activities.

The high school research program has resulted in dramatic increases in student interest and participation in competitive science and mathematics programs. This includes historic participation of St. Louis minority students in local, regional, state, and national science competitions. Annually, based on this work, of the more than 200 students with strengthened mathematics and science backgrounds graduating from St. Louis Public and other area high schools, more than 50% go on to undergraduate study and 60% of that group declare mathematics, science, and engineering majors.

Students entering this program begin with The Incubator Scientist's Pledge: *As an Incubator Scientist, I pledge to be responsible, diligent, and creative; to strive for academic excellence in every subject; to promote the love of science through research and involvement; to strive toward a career in science and technology through higher education;and to foster the spirit of teamwork. This I pledge to myself, my organization, and my school.*

PROJECT TESTIMONIALS

"The activities of the St. Louis CRCM have contributed positively to competitive science involvements of middle and high school students enrolled in our schools. Participation in science fairs and research activities has increased significantly as a result of these programs. The Incubator Scientists Program has had clear and impressive impact on competitive science involvements, as well as the college attendance rate of students from Beaumont High School. This program enhances our science and mathematics curriculum and has our continued support."

Dr. Julius C. Dix,
Associate Superintendent
Middle and Secondary School Education
St. Louis Public Schools

"Programs of the St. Louis CRCM are important curriculum additions. These activities have dramatically increased the use of investigation as a pedagogical approach in science and mathematics classes. Students are responding extremely well to this approach which has created an excitement about science in this school."

Joseph H. DuBose, Principal
Sumner High School

"My classes are certainly more lively now, and I do admit, students take to doing investigations. It means a lot more work for teachers sometimes, but when the projects are done and exhibited in the school, everyone shares the feeling of accomplishment."

Oscar Williams,
Science Department Chair
Beaumont High School

"The CRCM programs helped me envision the next step. I really benefitted from having people expect me to do more. Preparing for and giving the oral presentations was one of the hardest, but the best things that could have happened to me."

Kamafie Byrd,
Freshman Chemistry Major
University of Arkansas at Pine Bluff

GENERAL PROGRAM DATA

Number of Level I Students	1846
Number of Level II Students	10,400
Number of Elementary Schools	28
Number of Middle Schools	49
Number of High Schools	106
Number of School Districts	4
Number of Community-Based Organizations Involved	8
Number of Industries Involved	25
Total Number of Precollege Students	1846
Total Number of Program Activities during the Year	14
Number of Ongoing Activities	7
Number of One-Day Activities	0
Number of Periodic Activities	7

EXEMPLARY PROJECT STRATEGIC PLAN AND OUTCOMES

A Strategy that Works in Encouraging Science Achievement by At-Risk Students

The "BUMBLEBEE" Component

The "Bumblebee" component is a co-curricular activity for 9th- through 10th-grade students enrolled in any science or mathematics class. It is designed to augment course instruction and practice by inserting opportunities during the school week for students to select topics, plan, produce, and present science projects.

The bumblebee, having a body shape and size too large to be supported in flight by its relatively smaller wings, flies despite this physical fact. Students in this program can also defy physical facts. Just as the bumblebee defies the odds and flies, Incubator Scientists defy odds by using science as a "sling" to propel themselves to undergraduate study in preparation for productive futures as scientists, mathematicians, and engineers.

When encouraged by school system leadership, teachers incorporate investigation, using project completion as a course evaluation measure. Aided by weekly visits of resource science and mathematics professionals who work directly with specific students, as well as supportively with an entire class through the teacher, students develop commitment and discipline in designing and executing a study of their own choosing. Students are guided to analyze problems, generate reasonable hypotheses, evaluate evidence, and raise questions about science and technology in their own lives and in society.

FROM WISDOM TO VISION — The "Bumblebee" Club Motto

Tell me; I'll forget
Show me; I may remember
Involve me; I will understand

FROM "BUMBLEBEE" TO INCUBATOR SCIENTIST

While students may elect Incubator program involvement, 10th-grade mathematics teachers and counselors identify students who demonstrate high levels of interest and motivation in doing their bumblebee projects. Students who do not do early projects but who have potential for success in upper division science classes are also recommended. Project staff meet with those students and their parents, typically in a weekend retreat where university and industry researchers attend to provide orientation to careers in the sciences, mathematics, and engineering. Students commit to a two-year sequence of activities that begins at the end of the 10th-grade year.

Students enroll in a five-week summer science academy, which includes an extended day orientation to laboratory and library research activities. This component also provides for approximately 32 hours (two three day sessions) of intensive orientation to college courses and college course study requirements. During "immersion," which is convened as weekend visits to a residential campus, students receive an introduction to chemistry and careers in chemistry, computer science, and engineering. Students also engage in discussions and planning sessions on the application of the scientific method. Immersion sessions have two principal objectives:

- To actively involve students in an environment where scientific thinking is taking place—to involve students in generating scientific ideas.
- To assist students in translating some of their ideas into workable science projects.

Other intervention activities include the following:

- After the introductory summer experience, students may apply to work as student research assistants in the labs of faculty and industry researchers.
- Students placed in industry or with university faculty seek placement where the researcher's work is related

"The CRCM programs helped me envision the next step. I really benefitted from having people expect me to do more. Preparing for and giving the oral presentations was one of the hardest, but the best things that could have happened to me."

KAMAHL BYRD,
Freshman Chemistry Major
University of Arkansas
at Pine Bluff

to the student's research interest. The researcher determines the readiness of a student for participation in laboratory activities.

- Students work, on average, 8–10 hours per week in the sponsoring laboratory and on their own research.
- Saturday mornings during students' junior year should be spent in math review sessions, as students plan to take the ACT/SAT tests for the first time. Other standardized test preparatory activities are provided to encourage competitive performance on college entrance examinations.

The National Science Foundation's Conference on Diversity in the Scientific and Technological Workforce, as well as AAAS's annual meeting of the Junior Division provide unique opportunities for students to demonstrate their skills and potential, as they network with other students and researchers involved in the scientific enterprise.

SUCCESS CRITERIA

These criteria include increased participation of urban minority and first generation students in local, district, state, and national science fairs and symposia; improved motivation for science and math study, as evidenced by increased enrollment in upper-level mathematics and science courses (recommended college preparatory sequence); and increased enrollment of target students as undergraduates with science and engineering majors.

TEACHERS AS KEY

The teacher training component for this program supports teachers in viewing exemplary practice, gaining personal research experience through summer activities, and guiding students' research and project development activities.

ACCESS 2000 CHICAGO PARTNERSHIP

(established 1989)

INSTITUTION
LOYOLA UNIVERSITY OF CHICAGO
CHICAGO, ILLINOIS

PRINCIPAL INVESTIGATOR
ERIC HAMILTON

PROJECT DIRECTOR
MICHAEL HYATT

PROJECT SUMMARY

ANDERSON MEDAL

In February 1993, the Business–Higher Education Forum of the American Council on Education formally awarded Access 2000 the first place Robert Anderson Gold Medal recognizing the outstanding partnerships among business, higher education, and public schools.

Access 2000 began operation in September 1990. The partnership now includes 12 contractual partners: the Chicago Public Schools, five universities (Chicago State University, Illinois Institute of Technology, Loyola University, Northwestern University, University of Illinois at Chicago), two community organizations (Aspira of Illinois and Chicago Urban League), a public/private organization (the Institute of Illinois), and a national laboratory (Argonne). Additionally, Fermi National Lab and the University of Chicago participate in CASPAR. These partners cooperatively exert an array of coordinated in-school and out-of-school precollege efforts to increase significantly and measurably the number of underrepresented minority students who graduate from high school planning and prepared to enter college SEM majors.

These activities cut across all grade levels and all disciplines. A number of them are nationally distinctive or have received extensive recognition. The activities link at least 10 other Federal and state grants and provide a paradigm for cooperative structuring of urban SEM educational efforts. The activities make not only fiscal linkages but programmatic ones. One of the aspects of the CRCM rated highly in the July 1991 RSV was a matrix showing 21 distinct interactions between programs in the CRCM—interactions through which programs contributed to one another. For example, leaders from the Holistic Tutoring Center provided training for tutors from the Urban League's Black Churches Project and the Aspira Learning Centers. Such interac-

tions continue although they are no longer the one feature that distinguishes the CRCM from being a simple umbrella grant.

One of the most significant resources offered by Access 2000 is the Chicago Science Explorers Project (CSEP) at Argonne National Laboratory. CSEP is primarily funded by the Department of Energy (although it also receives support from NSF's Access 2000 grant) and provides science teacher enhancement services centered around the New Explorers videotape series by Chicago anchorman Bill Kurtis. This nationally acclaimed project involves the collaboration of virtually every university, every science museum, and community groups throughout Chicago to provide supplementary materials and follow-ups for in-school presentation of the New Explorers series. In 1992, Chicago Science Explorers served more than 20,000 youngsters in the Chicago Public School system through teacher support services.

CSEP works directly with the Black Churches Project (BCP), providing New Explorers videotapes and the supporting materials, and arranging field trips for students in BCP to its network of museums, universities, and national labs. The principal educational coordinator for CSEP, Ms. LaVonia Ousley, was awarded the Urban League's most prestigious civic award in 1992 for her efforts with the BCP. She was also honored with a Points of Light award in a special ceremony with Department of Energy Secretary James Watkins that same year.

From the inception of Access 2000, the BCP has been one of our featured projects because it provides community access for efforts like CSEP, and also because it provides a model for other efforts. In fact, one of the most critical developments in the evolution of the partnership occurred when we approached the Amoco Foundation with a description of the BCP and how it could be enhanced in a partnership with Access 2000. Then we inquired about the possibility of replicating the BCP model in Chicago's Latino community through a major CBO, Aspira of Illinois. In part because of efforts by the Institute of Illinois, another partner, the Amoco Foundation has provided Access 2000 with $75,000 since 1991 to replicate BCP in the form of two Aspira Math and Learning Centers in Chicago's Humboldt Park. It should be noted that the Explorers Project works at least as well with Aspira as it did with the Urban League.

PROJECT TESTIMONIALS

"Access 2000 has successfully brought together diverse stakeholders in Chicago's educational system to work cooperatively to improve the lives and learning of children in our schools. This is why Access 2000 has received such strong support from members of the Illinois Congressional delegation…The [Anderson Medal] recognition demonstrates that in the midst of the problems plaguing Chicago Public Schools, it is possible to join hands and promote programs that help children get excited about education."

U.S. Senators Paul Simon and Carol Moseley-Braun in a joint letter, February 3, 1993

"It is clear that Access 2000 is successfully fulfilling its mission to increase the participation of the underrepresented minorities in science, engineering, and mathematics. It is doing so as a successful model of cooperation between the school, business, and higher education communities."

U.S. Senator Paul Simon

"The Access 2000 Chicago Partnership…has played a remarkable role in efforts citywide to create opportunity for the youngsters in our school system. Among the responsibilities of the Access 2000 staff has been the development of innovative approaches to some of our most difficult problems. Through Access 2000, every one of our 600 schools in Chicago has systemic and easy access to virtually every science program offered by the universities and Argonne National Laboratory. It is very clear that, with limited resources, Access 2000 has proven to be a remarkable model demonstrating the almost limitless possibilities that result when public schools, higher education, and the business community roll up their sleeves and work together for a common goal."

Ted Kimbrough, Former General Superintendent Chicago Public Schools

"I found this very inspiring. I think our kids really need to experience the excitement and the power of mathematics! This is truly a wonderful program. I am very excited about starting the school year and rallying my department. This was the first time I had any computer course, and it demonstrated the power that I can bring to mathematics education. I could not have designed a better course for myself."

Anonymous Teacher Evaluation

"It is clear that Access 2000 is successfully fulfilling its mission to increase the participation of the underrepresented minorities in science, engineering, and mathematics. It is doing so as a successful model of cooperation between the school, business, and higher education communities."

U.S. Senator Paul Simon

GENERAL PROGRAM DATA

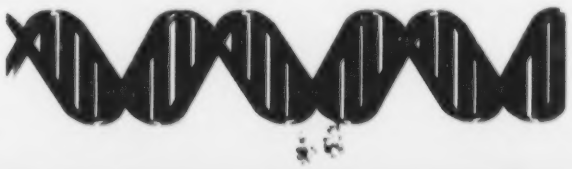
Number of Level I Students	1202
Number of Level II Students	7464
Number of Elementary Schools	181*
Number of Middle Schools	4**
Number of High Schools	94
Number of School Districts	1
Number of Community-Based Organizations Involved	3
Number of Industries Involved	6
Total Number of Precollege Students	8666
Total Number of Program Activities during the Year	48
Number of Ongoing Activities	5
Number of One-Day Activities	7
Number of Periodic Activities	32
Number of Other Activities	4

**This number represents the number of elementary/middle schools.*

***Only 4 exclusively middle schools participate in the program.*

STRATEGIC OUTCOMES—SAMPLE EVIDENCE OF PROGRAMMATIC SUCCESS

- 80% of teachers (n = 20) in **Access to Algebra** in-service began teaching new eighth-grade algebra classes as a result of the in-service (based on sample of half of cohort).
- Students of teachers in **TIMS** training (n of approximately 700), as a cohort, demonstrated statistically significant increases in science achievement standardized scores.
- Of **Early ID** students at IIT, 7% of Early ID indicated intention to take additional senior year mathematics, and 77% indicated intention to take additional senior year science as a result of Early ID.
- Students in **DASH** program at IIT produced 7% increase in general math/science achievement assessment following four-week DASH.
- 100% of 43 respondents in **PREP**/SSC program cosponsored by CRCM indicate increased interest in SEM careers.
- 68% of graduated high school students responding to a survey from CRCM programs are currently in SEM college majors.
- 60% of students in CRCM high school programs have participated in previous SEM enrichment activities.
- 25 **CPMP** minority students registered for AP Calculus (for 1993–1994 enrollment) at School A. From 1970 to 1993, only five minority students had ever taken Calculus.
- 63% of minority **CPMP** students were retained for three or more years, compared with an estimated 30% on non-CPMP students taking three or more years of math.
- 75% of minority **CPMP** algebra students received a grade of "C" or higher (aggregate over 1990–1993). Failure rate among minority students dropped from approximately 20% to approximately 3%.
- Attitudinal surveys for summer students are expected to yield statistically significant increases in pursuing SEM degrees in **Algebra Camp, August Computer Camp, CUL/PREP, Problem-Based Learning, and Young Scholars.**
- In **Chicago Science Explorers** Project, when students were asked to respond to a survey statement, "I could be a scientist if I wanted to," the average posttest answer was 4.07 (answers ranged from 1, definitely not; to 5, definitely) with a net change in positive responses of 299, out of 914 students responding. A net change of nearly 33% indicates that the Explorer's program is doing what it is supposed to do to present students with the possibility of a science career.
- In the **Chicago State University's Access Center** project, Kollege for Kids, 56% of the participants had eight-month to two-year increases in ITBS scores versus 40% for nonparticipants. In the After-School-Tutorial program, 23 students average 2.55 on first-term GPA and 3.55 GPA by the end of the year after participation.
- Of the 39 students of **Chicago State University Summer Challenge** for the academic year, 10 were seniors. 100% of these seniors have graduated, were accepted to college, were selected for membership in National Honor Society, and were awarded scholarships (not loans) for college. (Both Chicago State University entries are based on 1992 results and are to be verified for 1993.)



FLORIDA COMPREHENSIVE STATE CENTER FOR MINORITIES

(established 1989)

INSTITUTION
FLORIDA A&M UNIVERSITY
TALLAHASSEE, FLORIDA

PRINCIPAL INVESTIGATOR
BENNIE SAMUELS

PROJECT SUMMARY

To foster increased representation of minorities in the technical and scientific enterprises of the state and the Nation, the Florida Comprehensive State Center for Minorities (FCSCM) was established in 1989 with funds under the Comprehensive Regional Centers for Minorities (CRCM) of the National Science Foundation (NSF).

During the past four years, FCSCM has been able to develop and implement an effective intervention program in grades K–12. These interventions feature hand on science, mathematics, use of computers for children (grades K–3) in the kids in mathematics and science (KIMS) program; hands on science, mathematics, use of computers, career counseling, field trips, and parental involvement in the Benjamin Banneker Mathematics and Science Club (grades 4–5); hands on physical science, biological science, mathematics/prealgebra using manipulatives, field trips, simulated laboratory experiences with use of computers, data collection graphing and graphical analyses, career counseling, parental involvement, and development of scientific communication skills in the Etta Falconer Mathematics and Science Exploratory Club (grades 6–8); and laboratory-based chemistry, biology, and physics.

In order to accomplish our goals and objectives, FCSCM provided intervention programs in mathematics and science for the student participants, in-service training for teachers and administrators, and workshops for parents. During the regular school year, FCSCM and its 17 collaborating schools conducted after school programs, and during the summer FCSCM conducted summer programs. These activities provided nontraditional classroom activities using hands-on science and mathematical manipulatives. Students were placed in cooperative learning groups of three to four students, and the teacher served as the facilitator.

In order to improve the quality of instructions and to enable the teachers to become effective facilitators, teachers from FCSC-collaborating schools were selected to attend professional in-service training. The training was designed to improve the teachers' knowledge of the subject, to develop innovative pedagogical techniques, and to help the teachers become effective facilitators.

Parents were involved in the project also. They served as assistants and resource persons in the

Table 1.

FCSCM Minority High School Students Who Have Completed SEM Courses[1] Fall 1992 to Spring 1993

COURSES	GRADE LEVELS 9th	10th	11th	12th
Algebra I	85	80	34	12
Algebra II			62	40
Geometry		18	19	6
Trigonometry				
Math Analysis			16	27
Probability/Statistics				
Calculus				
AP Calculus				
Computer Science/Technology				
AP Computer Science				
Biology		72	10	4
AP Biology				
Chemistry			44	42
AP Chemistry				
Physics				2
AP Physics				
TOTAL	85	170	185	133

[1]*Note: FCSCM is still in the process of collecting information to complete this table.*

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after-school program. Additionally, they attended FCSCM-sponsored workshops designed to enable them to provide support and positive attitudes for their children.

Program activities included

- Enhancement of student skills, interests, and attitudes toward science and mathematics.
- Enhancement of parental involvement in promoting positive attitudes on the part of their children to study science and mathematics.
- Enhancement of teacher knowledge-based/pedagogical skills and attitudes about teaching science and mathematics to minority students.
- Participation of counselors and public school administrators to promote minority student learning science and mathematics throughout the educational spectrum K–12.

The Science Subject Readiness Club (grades 9–11) teaches intermediate and advanced chemistry, biology, and physics; trigonometry; career counseling; and parental counseling in the Mae Jemison Science and Mathematics Club (grades 11–12 and recent high school graduates). (These programs were named after African Americans who have made contributions in science and mathematics and was done to increase awareness in the participants of the contributions African Americans have made to science, engineering, and mathematics.) A six-week residential summer program was conducted for participants in grades 10–12 and recent high school graduates. These students received instructions in college-based chemistry, physics, biotechnology (modern day biology/molecular biology), introduction to Pascal, precalculus/calculus, Hypercard using multimedia (designed to train students to make scientific presentations effectively), and counseling and academic advisement. In addition, the participants made field trips to a local sewage plant, the Museum of Science and Industry, and the Harris Corporation in Tampa, Florida; the hydroelectric plant in St. Petersburg, Florida; and Martin Marietta in Orlando, Florida.

Thus, the overall strategic goals for the FCSCM are to

- *Triple the number of minority students graduating from FCSCM high schools who are adequately prepared academically to pursue majors in science, engineering, and mathematics.*
- *Develop model programs that can be replicated throughout the state of Florida.*

Table 2.

Systemic-Related Activities

ACTIVITIES/ACTION	OUTCOMES
• Conducted intervention programs for students in grades 4–12.	• A total of 430 level I students (grades 3–12 and recent high school graduates) completed these activities. Twenty students enrolled in SEM undergraduate programs at Florida A&M University.
• Established partnerships with 17 schools located in four school districts surrounding Tallahassee, Florida.	• Superintendents from the four school districts signed memoranda of agreement with FCSCM to promote reforms in mathematics and the sciences through curriculum assistance/development and teacher in-service training.
• Conducted a *Woodrow Wilson Algebra Institute* for in-service middle and high school mathematics teachers.	• A total of 28 teachers participated in in-service training in leadership skills, curriculum development in algebra, instructional methods, and improved content knowledge. Teachers will implement these techniques in their classes starting September 1992.
• Conducted a summer training institute (*Project SITE*) for in-service elementary mathematics teachers.	• A total of 24 teachers participated in in-service training in leadership skills, curriculum development in algebra, instructional methods and improved content knowledge. Teachers will implement these techniques in their classes starting September 1992.
• Conducted *Intermediate Mathematics Institute* for elementary and middle school mathematics teachers.	• A total of 9 teachers participated in in-service training on effective mathematics teaching and learning strategies in grades 3–5.
• Organized *Hypercard Workshop* for in-service middle and high school teachers.	• A total of 8 teachers participated in in-service training in which skills for incorporating the hypercard computer technology into the day-to-day classroom activities and lesson plans were taught.
• Conducted *Mathematics Their Way* Workshop for in-service K–2 school mathematics teachers.	• A total of 41 teachers participated in this activity-centered program which is based on the philosophy that every child can be successful in learning mathematics provided they are taught with the right methods.
• Conducted a summer institute, BSCS Science and Technology Workshop for in-service middle school science teachers.	• A total of 15 teachers participated in this workshop, which trained teachers in the teaching of an integrated life, earth, and physical science curriculum. Key features included transdisciplinary courses, flexible block scheduling, and team teaching.

PROJECT TESTIMONIALS

"Florida A&M University has played a catalytic role in illuminating the experiences of minority students

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in science, engineering, and mathematics and in increasing their interests in professional opportunities in these areas. The continuation of the multifocal FCSCM program is essential to the systemic change efforts of the National Science Foundation."

Virgil L. Morgan
Superintendent of Schools

"This program is allowing our students to be exposed to higher-level mathematics and science concepts that are not included in the regular curriculum for our elementary students. This allows students to get exposure to more mathematics and science by allowing them to participate in additional activities after the regular school day."

Elizabeth E. Turner, Principal
St. John Elementary School

"Florida A&M University has responded to the clarion of our Nation to rethink, redesign, re-engineer and retrain our students and teachers in science and math, so that as a Nation, we might regain our world-class leadership role and secure our future in the technologies. Merck & Co., Inc., is committed to the partnership we have worked so diligently to establish with Florida A&M University."

Moses R. Johnson, Ph.D.
Manager, Human Resources
Merck AgVet Division

"Experience has shown that collaborations between Leon County School System and Florida Agricultural and Mechanical University have been mutually beneficial. Such collaborations in the future will generate enthusiasm for the development of new and innovative ideas, insights, and skills to address the emerging problems of the under-representation of minorities in education, science, engineering, and mathematics and the lack of qualified professional science and mathematics teachers.

All efforts of Nims Middle School and Florida Agricultural and Mechanical University will jointly focus on developing, enhancing, and strengthening mutually beneficial projects in education."

Henry Murphy, Principal
R. Frank Nims Middle School

GENERAL PROGRAM DATA

Number of Level I Students	430
Number of Level II Students	9000
Number of Elementary Schools	7
Number of Middle Schools	6
Number of High Schools	4
Number of School Districts	5
Number of Community-Based Organizations Involved	0
Number of Industries Involved	4
Total Number of Precollege Students	8405
Total Number of Program Activities during the Year	17
Number of Ongoing Activities	5
Number of After-School Activities	4
Number of Periodic Activities	4

FCSCM DATABASE SYSTEM

The goal of the FCSCM database system is to provide an effective means of maintaining relevant current and historical information on FCSCM activities. The system is designed to gather information on programs and participants and to enable FCSCM to note trends in student enrollment, performances, retention, and persistence in science, engineering, and mathematics (SEM) courses.

The FCSCM database is currently running on an Apple Macintosh IIci file server in the FCSCM office. To maintain confidentiality and comply with state and Federal regulation, only authorized users have access to the database. The system was developed using the Claris File Maker Pro 2.0 software package.

Currently the FCSCM database system consists of the following four separate but related databases:

1. Program database
2. Teacher database
3. Student database
4. School database

All of the CRCM Minimum Obligatory Sets (MOS) are included in each database, along with several other data elements to help FCSCM in its tracking, monitoring, and evaluation.

EVALUATION AND TRACKING

The FCSCM database was designed to gather information for monitoring the development and implementation of its program activities. The process flow diagram is being used to assist in this effort.

In general, the FCSCM evaluation efforts are focused on determination of

- The successes and/or failures in terms of how program activities fulfill (a) the NSF objectives, (b) FCSCM goals and objectives, and (c) specific program goals and objectives.
- The strengths and/or weaknesses of program activities.
- The factors affecting student enrollment, retention, and persistence in SEM courses.
- How program activities can be improved or modified to serve FCSCM clients better.
- The most cost-effective approach to achieving the stated goals and objectives of program activities.

MINORITIES IN MATHEMATICS, SCIENCE, AND ENGINEERING (M²SE) CRCM

(established 1991)

INSTITUTION

UNIVERSITY OF CINCINNATI, CINCINNATI, OHIO

EXECUTIVE DIRECTOR

PATRICIA BREADY

CO-PRINCIPAL INVESTIGATORS

EDWARD SMITH

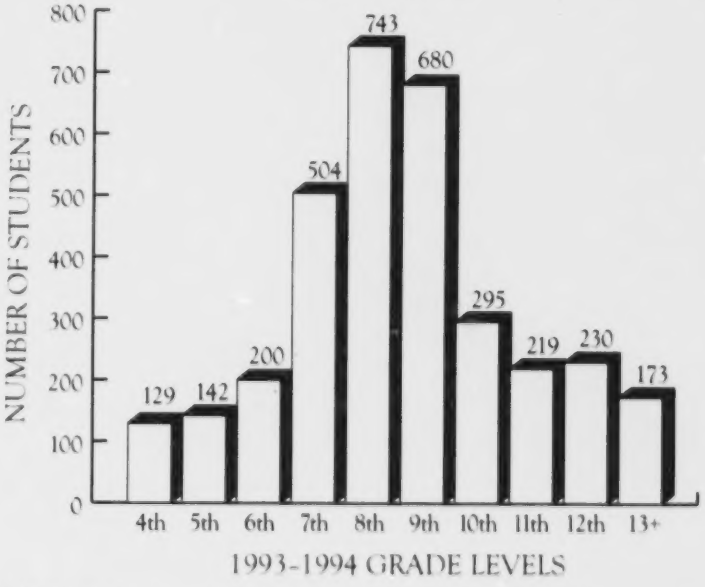
CALVERT SMITH

PROJECT SUMMARY

The M²SE Center was established to significantly increase the number of students of color who are motivated and prepared for mathematics, science, and engineering careers. Founded in 1989, the M²SE Center is a Cincinnati-based, expanding consortium of business and industry, colleges and universities, and public school systems. The charter members are Procter and Gamble, General Electric, Cincinnati Gas and Electric, Cincinnati Bell, the University of Cincinnati (Colleges of Applied Sciences, Arts and Sciences, and Engineering), Cincinnati Technical College, and the Cincinnati Public School (CPS) District.

Figure 1.

Minorities in Mathematics, Science, and Engineering (M²SE) Cincinnati CRCM Student Participants, 1993–1994 Total = 3315*



*AS OF 4/1/94; does not include new participants in spring and summer programs.

In 1991, the National Science Foundation (NSF) awarded M²SE five-year funding as a Comprehensive Regional Center for Minorities (CRCM), based on the strength of its innovative program design and collaborative structure. From its inception, M²SE has been a true collaboration of people, ideas, leadership, and resources from school districts, higher education, and industry. The Center has established key collaborations with the NSF Statewide Systemic Initiative, Ohio Project Discovery; Partners for Terrific Science; the National Action Committee for Minorities in Engineering; the National Society for Black Engineers; and over 48 regional industries and 16 community-based organizations.

The M²SE program is expanding to school districts throughout the greater Cincinnati area, but CPS is the single largest district. CPS is the M²SE charter district and was the site of the 1989–1990 pilot and the 1990–1991 prototype programs in three middle and three high schools. The case study of this paper focuses on a program analysis and redesign that emerged primarily from features of the CPS school structure and demographics.

M²SE incorporates student enrichment, teacher development, parent involvement, and SEM professional resources to create an infrastructure for students of color

within the science, engineering, and mathematics pipeline. The program strategies include

- Teacher development that enhances SEM content, instructional skills, classroom resources, and racial/ethnic awareness.
- Sequential, linked hands-on programs from fourth grade through high school, for C-average-and-above students.
- Early and active involvement of parents in SEM academic planning.
- Enriched and extended SEM experiences in the school year and summer.
- Career awareness through activities, information, and role models.
- Mentorship by SEM professionals and college students.
- M²SE/MOS database tracking of students from the first involvement with M²SE through the SEM pipeline.

PROJECT TESTIMONIALS

"The success of our M²SE program is a tribute to the dedication of our teachers, the support of our parents and the M²SE Center, and the interest and involvement of our business community."

Barbara A. Scholtz, School M²SE Coordinator Shroder Paideia Middle School

"At Aiken High School, we have been fortunate to be a part of the M²SE program since its second year. In fact, we were so committed to the philosophy of M²SE that we sought and received funding for us to join through out Partner-in-Education, GE Aircraft Engines. This support and enthusiasm has increased since our first involvement...I have seen student enthusiasm and interest in math, science, and engineering increase significantly during our participation in M²SE."

Jack Schroder, Principal Aiken High School

"I have heard teachers state that they have a renewed excitement for teaching because of the training they are receiving from M²SE and the additional resources for their students."

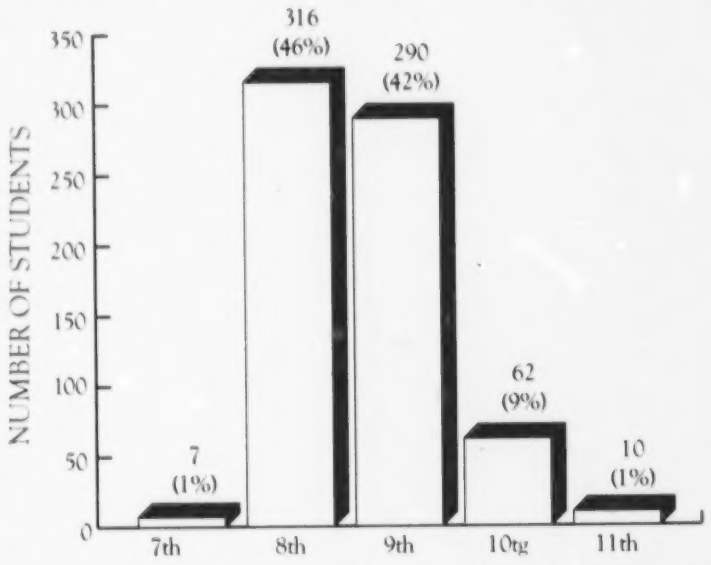
Anonymous

"The College of Applied Science has begun to enroll a few graduates of M²SE and we expect that number to increase...as the number of M²SE graduates increases."

Frances May Brooks, Director Counseling Center University of Cincinnati College of Applied Science

Figure 2.

Minorities in Mathematics, Science, and Engineering (M²SE) Cincinnati CRCM Student Success in Algebra One*



*Reported data for students affected by CRCM during their Algebra One enrollment; does not include new participants in spring and summer programs.

GENERAL PROGRAM DATA

Number of Level I Students	2064
Number of Level II Students	7924
Number of Elementary Schools	36
Number of Middle Schools	22
Number of High Schools	36
Number of School Districts	3
Number of Community-Based Organizations Involved	14
Number of Industries Involved	48
Total Number of Precollege Students	20,327
Total Number of Program Activities during the Year	55
Number of Ongoing Activities	28
Number of One-Day Activities	1
Number of Periodic Activities	26

EXEMPLARY PROJECT STRATEGIC PLAN AND OUTCOMES

As M²SE has expanded over the past five years, these strategies—in combination with features of the target area and schools—have resulted in a set of defining features of our CRCM.

SEQUENTIAL, LINKED STUDENT INVOLVEMENT

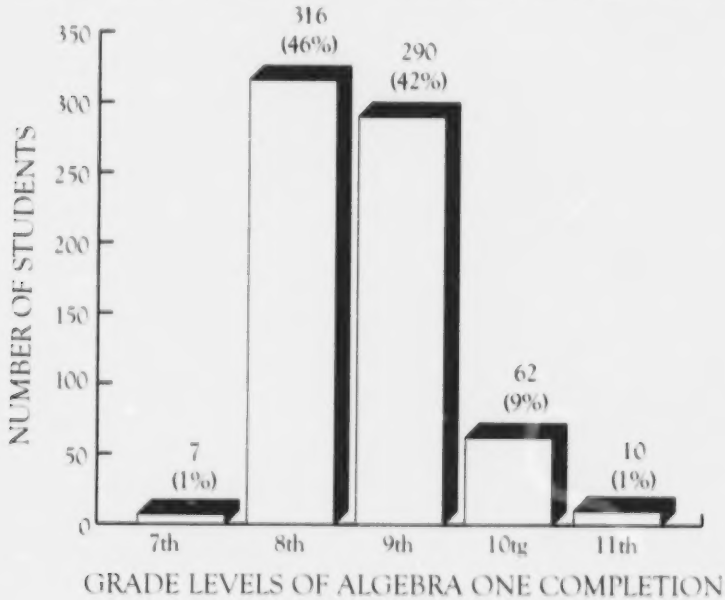
The M²SE conducts sequential SEM programs, providing linkages for students across school levels. This feature of M²SE has played a major role in our success in attracting industry collaborations. At present, science- and engineering-based industries in Dayton are exploring ways to become involved with M²SE because it offers a program linkage that other enrichment efforts in their area do not.

PARENT INVOLVEMENT

The involvement of parents of students of color in SEM enrichment programs is essential to building a family support system. M²SE requires parent involvement in all of its core programs and provides training to parents through programs such as the Say Yes to Math/Science Workshops and the Family Math Academy. The Parent Advisory Council is developing a network among M²SE parents across the CRCM.

Figure 3.

Minorities in Mathematics, Science, and Engineering (M²SE)
Cincinnati CRCM Student Success in Algebra One*



*Completion rate is 98%; compared with 50% for baseline of school districts. Data for student affected by CRCM during their Algebra One enrollment; does not include new participants in spring and summer programs.

ALGEBRA INITIATIVE

In Program Year 1991, initial analysis of grades reported in the M²SE/MOS database indicated a strong algebra profile. Students averaged 2.83 in their Algebra I courses, and 51% had completed Algebra I in eighth grade. As we looked further into the data, however, it became clear that there was a systemic school problem: algebra was not uniformly offered in the M²SE middle schools at the eighth-grade level, and ninth-grade performance in algebra was inadequate. Discussions were initiated with CPS, leading to the establishment of a pilot Algebra Initiative this year. Initially, the CPS group planning the Algebra Initiative was focused on the ninth grade. As they became more familiar with the NSF information about the need for algebra for eighth grade, to support the SEM pipeline, they revised their plans and are now also addressing algebra for eighth grade. Preliminary indications are that the initiative will be based on Project Algebra, using the University of Chicago mathematics textbook series adopted as part of the CPS unified K–12 math curriculum.

Mt. Healthy, a suburban district participating in M²SE, has structured an Algebra Initiative using the newly purchased Houghton Mifflin textbook series. The Mt. Healthy Initiative is starting for middle school. M²SE will assist with additional teacher development on how to incorporate computer software that accompanies the Houghton Mifflin text.

STRONG INDUSTRY COLLABORATION

The commitment of the Cincinnati-area business and industry base to M²SE is embedded throughout our program. Industries participate in all aspects of the CRCM, from planning to program implementation. Last year, Cincinnati Bell affiliated its BEST (Building Enthusiasm

for Science and Technology) program, which exposes high school students of color to technology. M²SE students receive priority consideration for acceptance to BEST, which is a summer experience, followed by special events throughout the school year. In part because of its involvement with M²SE, Cincinnati Bell is exploring how other Cincinnati industries could conduct their own BEST programs, which would expand the program nearly tenfold, from 100 students per year to 1000, over the next several years.

STUDENT INCENTIVES FOR COLLEGE

One of the known educational barriers to students of color is concern about financing higher education. Even with above-average academic records, most families are hard-pressed to envision meeting the rising costs of today's higher education. One of the outstanding successful collaborations within M²SE is the University of Cincinnati scholarship program attached to the Student Summer Institute. When students complete the institute's math and science course with a B or better, the university awards a one-year tuition scholarship. In the three years since this incentive was offered, 110 one-year scholarships have been awarded. At the 1993 tuition rate of $3500 per year, this represents $385,000 of scholarships in today's dollars.

MULTICULTURAL TRAINING FOR TEACHERS

In addition to enriching teacher SEM content and resources, M²SE teacher programs include multicultural skills and awareness development. This dimension is embedded within all teacher training, rather than being addressed through "sensitivity" or "special sections." For example, teacher training on SEM methodology such as cooperative learning addresses multicultural learning styles.

This M²SE strategy targets two teacher attitudes that can have a negative impact minority students—low expectation of students of color and doubt about these students' abilities.

The M²SE strategy is to educate teachers—as well as students and their parents—about SEM accomplishments by people of color to help overcome this classroom problem. In addition, our successful involvement of SEM professionals as mentors—most of whom are scientists and engineers of color—with M²SE school programs are working to change negative teacher attitudes.

MISSISSIPPI COMPREHENSIVE REGIONAL CENTER FOR MINORITIES

(established 1993)

INSTITUTION
JACKSON STATE UNIVERSITY
JACKSON, MISSISSIPPI

PRINCIPAL INVESTIGATOR
ABDUL K. MOHAMED

PROGRAM DIRECTOR
MARION TALLEY

PROJECT SUMMARY

The Mississippi CRCM is composed of academic activities in biology, communication skills, chemistry, computer science, environmental science, mathematics, physical science, and physics.

The structure of the program is stratified to accommodate students in grades 6 through recent 10. All students participate in communication skills (oral and written) and mathematics. Computer science and the other sciences are scheduled according to the particular grade level of the students. Typically a student participates in three academic activities, of which two are communication skills and mathematics. All academic activities in computer science and science involve laboratory hands-on participation by each student and/or groups of students depending upon the activity. Other activities of the program include spelling bees, debates, challenge bowls, reading, and recreation. Typically the academic and other activities span the hours of 8 a.m. to 8 p.m. daily. The duration of activities range from 4 to 6 weeks. A large percentage of the program is residential. The program staff comprises faculty at Jackson State University, Jackson Public School

teachers, and JSU student counselors.

The quantitative evidence of effectiveness can be demonstrated by the types of courses in which the students are enrolled at their respective schools, their performance in these courses, performance on standardized tests, their expressed career interest, and the support and participation by parents.

The primary goal of the MCRCM is to strengthen the education of minority students in mathematics, science, and communication skills in middle schools throughout the school districts selected so that they will be better prepared to follow mathematics and science track curricula in high school and thus result in increasing the pool of minority students choosing careers in mathematics, science, and engineering.

The program consists of the following components: Summer Academies, Saturday Academies, Family Math/Science, and Technical Support Services.

SPECIFIC OBJECTIVES

- To identify and recruit middle school students with strong interest in mathematics and science to participate in summer residential experience (math, science, computer applications, and communication skills).
- To establish a "Saturday Academy" program for middle school in mathematics, science, computer applications, and communications skills, which will enhance their academic preparation.
- To provide a four-week enhancement summer program in mathematics, science, and computer application for middle school teachers (grades 7–11) at Jackson State University.
- To involve and integrate the family into the teaching and learning of math/science for grades 6–12:
  —Community
  —Business/Industry/ Government (BIG)
  —National laboratories and other scientific organizations
- To ensure that prealgebra, algebra, and geometry are offered at each school in the target areas at grades seven, eight, and nine, respectively.
- To establish and utilize information and support clearinghouse focusing on precollege programs.
- To assess the program with appropriate evaluative instruments.

PROJECT TESTIMONIALS

"Jackson State's precollege programs identify and target students in middle school and stay with them through their senior years, involving them in enrichment activities. Most of the precollege programs are science and mathematics education oriented. All of them share a common purpose: to encourage secondary students to choose mathematics or science related majors when they attend college and to prepare them for success in those fields."

James E. Lyons, Sr.
President, Jackson State University

"I think staying on the campus is a great idea. It teaches me to be independent."

Crystal Truss
Eighth Grade

"My precollege summer experience has been enjoyable. I have met new friends, pursued hobbies, and learned many new and interesting things in science and mathematics that will be beneficial to me when I return to school. I am sure I will be a step ahead of most of my classmates."

Brian Winter
Ninth Grade

"My precollege summer experience has been a new and motivating experience for me. Everyday, we had to wake up at 6:00 in the morning to dress, eat, and be in class at 8:00 a.m. The classes started with math and ended with science. Recreation was scheduled after dinner. The day ended at 8:00 p.m. We looked forward to the next day to start all over again."

Julia James
Tenth Grade

"Campus life is great. The counselors are like big brothers and big sisters. They care about us, and they keep us out of trouble most of the time."

Paul Alleyne
Seventh Grade

GENERAL PROGRAM DATA

Number of Level I Students	1350
Number of Level II Students	2675
Number of Elementary Schools	29
Number of Middle Schools	39
Number of High Schools	40
Number of School Districts	39
Number of Community-Based Organizations Involved	10
Number of Industries Involved	1
Total Number of Precollege Students	4025
Total Number of Program Activities during the Year	13
Number of Ongoing Activities	4
Number of One-Day Activities	7
Number of Periodic Activities	2

EXEMPLARY PROJECT STRATEGIC PLAN AND OUTCOMES

Project Impact and Preliminary Outcomes

The impact of the project has resulted in a greater awareness among students, parents, and communities of the importance of mathematics, science, and communication skills at the middle school level. The parents are becoming supporters, advocates, and advisors in their children's selection of the appropriate mathematics and science courses beginning at the middle school level. In our recorded outcomes, students are selecting mathematics courses, in particular, so that they will be prepared to follow a college preparatory curriculum and be successful in pursuing mathematics, science, and engineering careers. Students are taking courses in the sciences, which include life science, earth science, physical science, general science, biology, human anatomy, chemistry, and physics, in grades 6 through 10. This information is reflected in tables that show the distribution of mathematics and science courses taken. As reflected in the tables, which show distribution of students' academic appraisal percentile rankings, the students are performing well on standardized examinations and their mathematics, science, and English courses. The students are also expressing strong interest in careers in mathematics, science, and engineering, according to the tables which show the distribution of students career interest.

The distribution of the 148 students representing 32 schools indicates that the curriculum is becoming more and more unified in the mathematics, science, and English courses being offered.

The project also has a strong parent group involved in the nurturing process. The parents, by and large, are diverse in their backgrounds and professions. However, with the networking strategies planned to ensure their support in the efforts to have an impact on the number of students entering the pipeline, the diversity is becoming an asset. Some of the strategies planned are (1) establish and maintain dialogue among parents by way of telephone and meetings; (2) establish support groups to work with each other at various community sites; (3) establish a parent newsletter to share activities and accomplishment of the children and their activities; (4) work with each other, mathematics and science teachers, counselors, and the director in the course selection of the children; and (5) form a support group to work with children in completing home assignments. A parental attitudinal survey instrument was developed, and parents were invited to participate voluntarily. The instrument and results are provided.

MCRCM TRACKING AND MONITORING SYSTEM OVERVIEW

The veritable need to ensure an objective evaluation of the precollege programs is intrinsic to the goals and objectives of these programs. Evaluation leads to determination of the success of the activities, highlights the hidden drawbacks that undermine the effectiveness of the activities, and presents an opportunity for administrators to consolidate the gains and rectify the problems. To facilitate such evaluation, the project is proposing a comprehensive precollege database system. The precollege database will contain all the information necessary for decision-making processes within the PreCollege Organization at Jackson State University, which has undertaken the task of preparing minority precollege students for a Science, Engineering, and Mathematics (SEM) career.

The goal of the Precollege Database System is to track and monitor the progress of precollege program participants at each grade level, from the entering grade to the 12th grade. At each grade level, the student's performance in his/her regular course work, standardized tests, and other quantitative measures will be recorded. Also, the student's participation and performance in precollege activities at JSU will be recorded. Other nonquantitative measures such as student's attitude toward a SEM career at each grade level will be also contained in the database. The Precollege Database System will be interfaced with a confederation of databases, e.g., databases used for tracking participation in research and academic enhancement programs at the undergraduate level, to determine the impact of precollege programs on the SEM preparedness of students who are pursuing higher education.

To facilitate information retrieval from the Precollege Database System, the project proposes a querying system. Longitudinal querying will determine the aptitude and performance of all participants (or a selected group) for a particular grade level. Horizontal querying will report the pattern of development of skills and abilities for a particular student from the entering grade to the terminating grade. Diagonal querying will determine the impact of precollege activities in subsequent years.

The success of such a tracking and monitoring system is evident from similar efforts made at the undergraduate and graduate levels. The database system can be shared by the use of computer networks with other sites involved in similar initiatives. The impact of the Precollege Database System will go a long way in the evaluation process of various precollege programs at JSU. This will naturally lead to enhancement of precollege program delivery to minority students, thus making an overall impact on their potential to become SEM careerists.

NORTHEASTERN UNIVERSITY COMPREHENSIVE REGIONAL CENTER FOR MINORITIES

(established 1993)

INSTITUTION
NORTHEASTERN UNIVERSITY
BOSTON, MASSACHUSETTS

PRINCIPAL INVESTIGATOR
DAVID C. BLACKMAN

ASSOCIATE PROJECT DIRECTOR
PEGGY KEMP

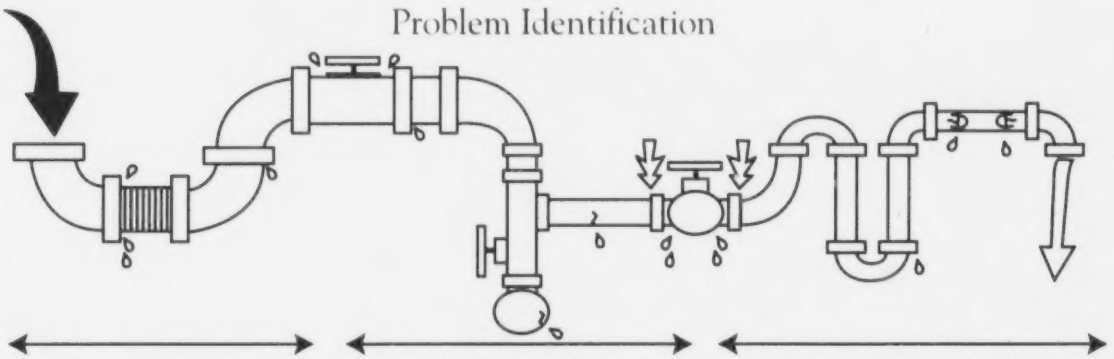
PROJECT SUMMARY

The Northeastern University Comprehensive Regional Center for Minorities (NUCRCM) develops new programs and collaborates with groups already involved in a substantive way with science and mathematics programs for African-American, Latinos, and Native American students in grades K–12 in the Boston–Cambridge Metropolitan Area. The center develops all of its programs for its target audience of students at locations strategically placed throughout the Boston–Cambridge Metropolitan Area. The programs developed through the center have these objectives:

- Establish working coalitions among existing programs and institutions that provide their expertise, influence, and resources to promote systemic changes in the science and mathematics preparation of minority students in grades K–12.
- Establish and enforce requirements that all students must successfully complete algebra by the end of eighth grade and precalculus courses upon completion of high school; get consensus on which differing high school mathematics courses are equivalents to bring uniformity of instruction to high school mathematics course offerings.
- Provide teachers of science and mathematics extensive additional in-service training and support, in part to correct the misalignment of precollege mathematics and science with college coursework.
- Ensure that all teachers and students have adequate access to curricula materials

Figure 1.

Problem Identification


Elementary School
Middle & High School
2-Year and 4-Year Colleges
• Instruction by transmission
• De-emphasis on science
• Tracking
• Emphasis on testing
• Underprepared teachers
• Low expectations
• Summer learning loss
• Negative peer pressure
• Unaligned sequence of study
• Lack of vision of success
• Out-of-school issues and concerns
• Difficult transition to college
• Inadequate pre-college preparation
• Difficulties studying while holding job
• Absence of role models
• Barriers to transfer from 2-year study to 4-year programs of study

and educational technology for teaching science and mathematics appropriate to contemporary applications.

The measure of success will be related to the center's ability to

- Recruit and retain the least advantaged students.
- Track the number and demographic characteristics of program participants and their retention rate—these data characteristics in conformity with the Minimal Obligatory Set (MOS) developed by all of the CRCMs and endorsed by NSF.
- Change student, parent, teacher, and coalition member attitudes about abilities and performance in school generally and in science and mathematics specifically.
- Increase the number of participants who complete high school and undergraduate academic programs leading to careers in mathematics and science or to postgraduate study in science and mathematics.
- Monitor the effectiveness of the center-sponsored training programs for teachers and counselors.

PROJECT TESTIMONIALS

"The research data show that one of the keys to improving the quality of public education is getting parents more involved in the process. That is why I'm pleased that the CRCM places such a strong emphasis on seeking parents' contributions. The Parents Institute, along with the other NUCRCM programs, can have a major impact on the quality of our schools."

Lois Harrison-Jones, Superintendent
Boston Public School System

"NUCRCM has introduced our teachers to a new graphic calculator that is going to completely change the way we teach algebra and calculus. Students used to spend a lot of time plotting graphs by hand. But with the calculator, they just type in an equation, hit the 'command' button, and their graph instantly appears on the screen. Students spend a lot less class time drawing graphs and a lot more time learning about the mathematical principles the graphs illustrate.

The fact that students and teachers are learning to use these calculators at the same time has created a very lively atmosphere in our classrooms, with a lot of give and take."

Patricia Tremblay, Assistant Headmaster
Hyde Park High

"The establishment of the NUCRCM is the latest example of our university's commitment to public education. I am very proud that Northeastern University is hosting this exciting and innovative program."

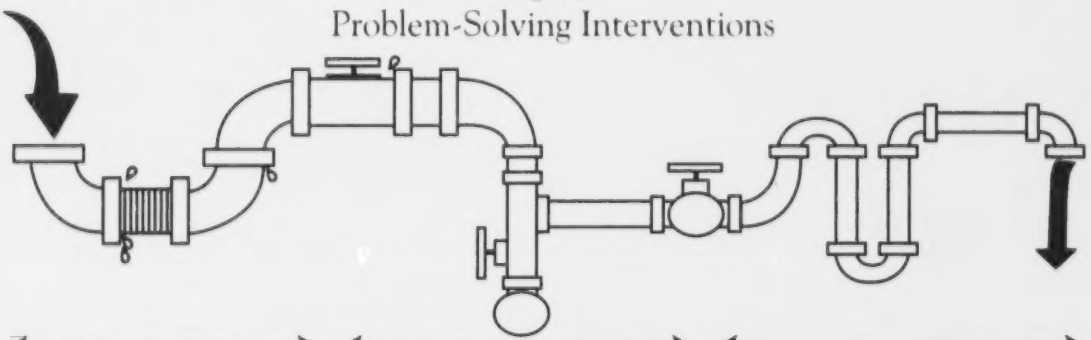
John A. Curry, President
Northeastern University

"Most of the parents I talk to care deeply about their children's education, but they don't always have clear ideas about how to get involved with the educational process. The Parents Institute offers them a forum for expressing their concerns about the schools."

Anonymous

Figure 2.

Problem-Solving Interventions



Elementary School	Middle School	High School to College
• COSMOS II • Paul Robeson Institute • Hands-On Science Lab • Individualized Instruction • Parent Involvement • Teacher Training	• Explorers Club • Mathematics Lab • Mass Pep • Algebra Lab/E To The Nth Power • Hands On Science Lab • Teacher Training	• Jr. Math Intervention • Careers In Bio-Technology Program • Math & Science Intensive • Thompson's Island • Career Counseling/Urban Scholars • Student is prepared to enter College

GENERAL PROGRAM DATA

Number of Level I Students 1899
Number of Level II Students 8440
Number of Elementary Schools 2
Number of Middle Schools 5
Number of High Schools 8
Number of School Districts 45
Number of Community-Based Organizations Involved 20
Number of Industries Involved 5
Total Number of Precollege Students 10,339
Total Number of Program Activities during the Year 106
Number of Ongoing Activities 49
Number of One-Day Activities 15
Number of Periodic Activities 42

EXEMPLARY PROJECT STRATEGIC PLAN AND OUTCOMES

The Explorers Club

The Explorers Club is an inquiry-based, hands-on science program combining the collaborative training and teaching efforts of Northeastern University and the Boston Public Schools. In this project, high school students taught by their science teachers, teaching consultants, and NU professors have become teachers and effective mentors for elementary school children in an inquiry-based approach to science learning. Fifty high school students and 241 elementary students have participated in the program during the three-year pilot phase. Eighteen high school and elementary teachers have joined with training consultants, and later NU professors, to study new approaches to teaching and learning science alongside the Urban Scholar high schoolers. We expect the program to double during the 1993–94 school year with the addition of one new class in each pilot school.

Students have reported through journals, questionnaires, and observations their experiences in the Explorers Club. They have talked about science and math, about themselves, about teaching, about learning, and about having fun in and making sense of their world. They have learned updated approaches to science and math through activities that explore real world problems and real world people. They have looked at the relationship of geometric quilt patterns to everyday math skills, what does and can happen to hazardous waste, and why you might end up in the hospital if you do not have a good pulley system for hoisting construction material heavier than you are. Last year NU professors instructed three curriculum units in (1) biotechnology, which demonstrated applications such as time release medications; (2) mathematics, which included geometric manipulatives and patterns; and (3) physics, which explored lessons in optics, buoyancy, and simple machines. The

Table 1.

Baseline Data — Minority Enrollment in 9th-Grade Algebra June 1992[1]

Member School	Total Minority	Ethnicity			Total Enrolled		Total Number Passed
		Afr. Am.	Latino	Nat. Am.	Number	Percent	
Boston Latin School	148	32	10		42	28	34
Boston Latin Academy	114	33	7		40	35	56
O'Bryant High	160	130	24		154	96	115
Brighton High	248	52	31	2	85	34	62
Dorchester High	228	40	8	1	49	21	39
English High	308	35	31		66	21	42
Hyde Park High	175	52	13		65	37	42
West Roxbury High	239	81	23	1	105	44	79
Total	1620	455	147	4	606	37	449

[1]*The number of underrepresented 9th-grade students within NUCRCM's participating schools who are enrolled in Algebra I shall double from the current level of 449, or 28%, to 898, or 100%:*
Quantitative goal for 1993/93—493 (10%) Quantitative goal for 1994/95—584 (30%)
Quantitative goal for 1995/96—673 (50%) Quantitative goal for 1996/97—763 (70%)
Quantitative goal for 1997/98—898 (100%)

algebra readiness activities are based on the premise that all students can understand and learn algebra. In order for this to occur, students must be actively involved in their learning, and the instruction must address multiple learning styles that leads to effective learning.

The Explorers Club is bringing about broader systemic changes within schools because it simultaneously reaches elementary through high school students and their teachers. The goals and implementation of the program follow the recommendations of the most current research on staff development:

1. *Teachers need to be involved in all phases of planning.*

Teachers in the Explorers Club continue to participate in planning sessions, instruction, feedback meetings, and evaluation processes. They see the need for continuing these approaches to science instruction throughout the entire year and are invested in working out scheduling problems and other obstacles to program development.

2. *Enhancing teacher growth affects many more students on a more permanent and ongoing basis than working exclusively with students.*

In the Explorers Club, teachers learn new approaches and topics in science as they guide their students. Teachers are becoming models in their schools and other teachers are joining through this example.

3. *Development should include the entire school community.*

Both high school and elementary teachers value working alongside students as colleagues. Changing curriculum and instruction through collaborative efforts with university resources, teachers, students, and administrative support is a beginning to changing and educating the school community.

4. *More work needs to be done on the content of academic subjects in teaching.*

Elementary teachers are now included in instructional training with high school teachers and students. This collegial process serves to upgrade teachers' skills and awareness so that science education can begin earlier for all students.

Table 2.

Baseline Data — Minority Enrollment in 10th-Grade Geometry June 1992[1]

Member School	Total Minority	Ethnicity			Total Enrolled		Total Number Passed
		Afr. Am.	Latino	Nat. Am.	Number	Percent	
Boston Latin School	106	61	43		104	98	82
Boston Latin Academy	84	48	10	1	59	70	57
O'Bryant High	158	84	28		112	71	94
Brighton High	194	37	26		63	32	49
Dorchester High	173	28	7		35	20	26
English High	287	28	21		49	17	41
Hyde Park High	125	3	1		4	3	3
West Roxbury High	269	53	15		68	25	60
Total	1369	342	151	1	494	35	412

[1]The number of underrepresented 10th-grade students within NUCRCM's participating schools who are enrolled in Geometry shall double from the current level of 412, or 29.5%, to 824, or 100%:

Quantitative goal for 1993/93—453 (10%) Quantitative goal for 1994/95—536 (30%)
Quantitative goal for 1995/96—618 (50%) Quantitative goal for 1996/97—700 (70%)
Quantitative goal for 1997/98—824 (100%)

BEST COPY AVAILABLE

THE BALTIMORE SEMPREP PROGRAM (SCIENCE, ENGINEERING, AND MATHEMATICS PRECOLLEGE PREPARATION)

(established 1993)

INSTITUTION
MORGAN STATE UNIVERSITY
BALTIMORE, MARYLAND

PRINCIPAL INVESTIGATOR
EUGENE M. DELOATCH

PROJECT DIRECTOR
EDMONIA T. YATES

PROJECT SUMMARY

The partners in the SEMPREP project are Towson State University, the National Technical Association, the Maryland Science Center, the Maryland Mathematics Engineering and Science Achievement (MESA) program, the Academic Champions of Excellence (ACE) program, the Center for Excellence in Mathematics and Science Education (CEMSE), industry partners, and the Baltimore city public school system.

The program focuses on Baltimore City public schools and has the goal of increasing minority representation in science, engineering, and mathematics careers. The intervention and outreach initiatives of the Baltimore CRCM program, named SEMPREP (Science, Engineering, and Mathematics Precollege Preparation), include students, teachers, parents, and the school system to insure that effective initiatives are supported and institutionalized. Being effective means contributing to increasing the quantity and quality of youth who complete high school academically prepared and motivated to pursue science, engineering, and mathematics career courses in college.

During the 1990–1991 school year, Baltimore City served 90,000 minority students. Approximately 400 graduating seniors completed a precalculus or higher-level mathematics course while 800 eighth graders and 2500 ninth graders completed Algebra I.

The SEMPREP Center's five-year commitment is to increase these numbers significantly; the goals are the following:

- to double the number of eighth and ninth graders who successfully complete Algebra I.
- to triple the number of high school graduates who have successfully completed a minimum of biology and chemistry and are prepared to enter a college-level calculus course.
- to have a comprehensive database of students who are monitored in science, engineering, and mathematics preparatory courses through their precollege education.

One of SEMPREP's pilot programs at the West Baltimore Middle School, the front-runner for the Baltimore school system's mandate that all eighth graders would be enrolled in Algebra I or Algebra IA in 1993–1994, will continue with greater emphasis on mathematics and science instruction in grades six and seven.

PROJECT TESTIMONIALS

"I am very pleased with the Scholastic Aptitude Test Program that was provided at Morgan for my son as well as other minority students. This program was an educational experience for my son Stephen, and his math and English grades increased dramatically this quarter."

Mrs. Helen J. Williams, Parent
Baltimore, Maryland

"While central office educators were involved in brainstorming about possible focus areas and sites, actual decisions about participation in program and the specifics of the program occurred at the school level. While this feature might seem unimportant, this feature has contributed to stronger school programs and clearer focus on students because it has assured greater commitment of site-base educators to making the program work. In keeping with research findings on effective schools, programmatic decisions occur at the site of real change, the school. Additionally, this feature has placed central office educators in the role of consultants to school staff rather than monitors and supervisors of the program."

Dr. Maurice Howard
Assistant Superintendent of Curriculum and Instruction
Baltimore City Public Schools

"The SEMPREP program has been most supportive of West Baltimore Middle School's interest in offering Algebra I to every eighth-grade student. In fact, the SEMPREP staff gave both moral and financial support to the school staff and assisted significantly with implementation.

As a result of SEMPREP's support, staff development was provided for both mathematics and other West Baltimore Middle School teachers by Morgan State University staff and other consultants. SEMPREP also supplied funds for the purchase of algebra textbooks, facilitated on-on-one tutoring for the eighth-grade algebra students by Morgan State University students, and assisted with parent orientation for the algebra program."

Ms. Sheila Coleman
Principal of
West Baltimore Middle School

"I did not begin work until the second week, but it was a terrific experience. I could not believe what I was doing. I was working in an industry doing real work with other people."

Alex Jones, Sharp Plus

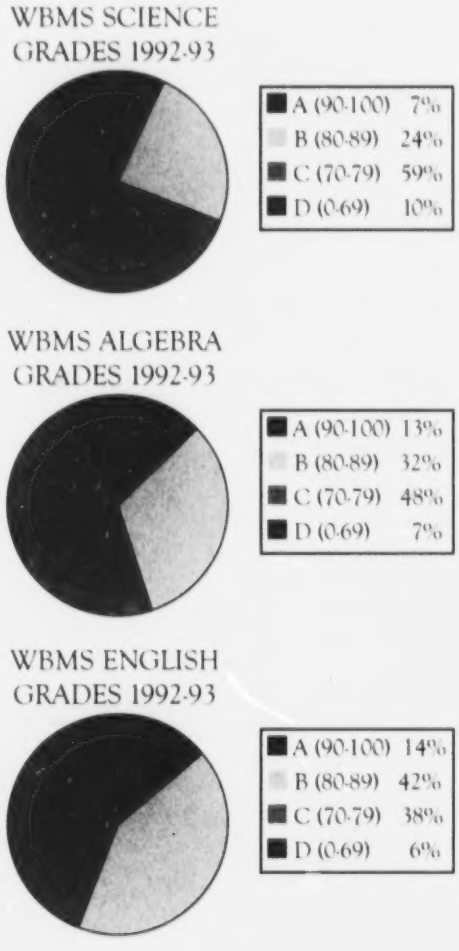
GENERAL PROGRAM DATA

Number of Level I Students	1300
Number of Level II Students	1420
Number of Elementary Schools	118
Number of Middle Schools	27*
Number of High Schools	27**
Number of School Districts	1
Number of Community-Based Organizations Involved	6
Number of Industries Involved	6
Total Number of Precollege Students	2720
Total Number of Program Activities during the Year	40
Number of Ongoing Activities	8
Number of One-Day Activities	26
Number of Periodic Activities	6

**Includes 4 Elementary–Middle Schools*
***Includes 1 School for the Arts, 3 VoTech, 10 Exceptional*

Figure 1.

Algebra 1, Physical Science, and English Grades



EXEMPLARY PROJECT STRATEGIC PLAN AND OUTCOMES

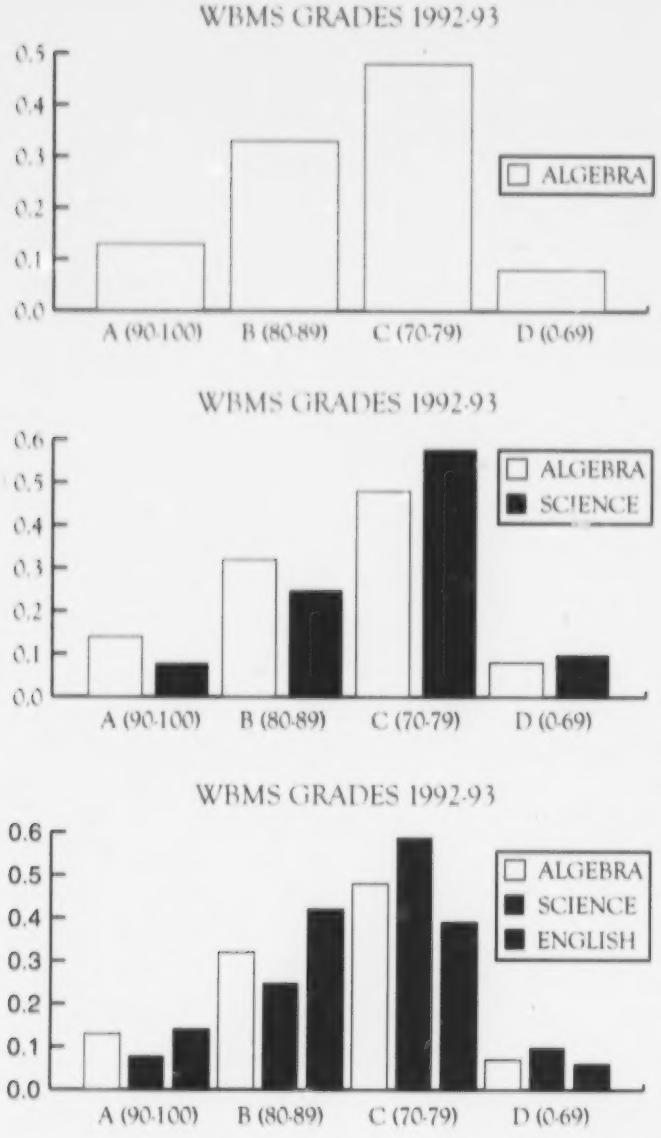
The Algebra I Project
West Baltimore Middle School
(WBMS)

The mathematics picture that existed in the Baltimore city public schools (BCPS) in the fall of 1992 was dismal. The following information was shared in a report issued by the Curriculum and Instruction Office of BCPS. In fall of 1992,

- Less than 5 percent of seventh-grade students were enrolled in Algebra I.
- Less than 25 percent of eighth-grade students were enrolled in Algebra I.
- Fifty percent of students were enrolled in the first year of a course that covers the content of algebra over a two year period by grade nine.
- Roughly 20 percent of students in BCPS were enrolled in Algebra I, Algebra II, or Geometry.

Figure 2.

Comparison of Algebra 1, Physical Science, and English Grades



- Approximately 13 percent of an age cohort remained in mathematics at grade 12.
- Only about 3 percent of the cohort took calculus.

With the above picture in mind and the knowledge that no student should be denied the opportunity to learn the mathematical skills that a technological society demands for survival, the SEMPREP program seized the opportunity to break the existing practice of sorting students into various mathematics classes (Math 8, Algebra I, Algebra IA, Algebra IB, etc.). In this age of mathematics, we know the importance of algebra:

- Algebra is the "gateway" to the understanding of mathematical systems and structures.
- Algebra provides the means for describing and analyzing relationships.
- Algebra enables students to acquire the skills that a technological society demands for survival.
- Generally, the study of algebra marks the turning point in a student's decision to continue or not in the study of higher mathematics.
- The quality of instruction in algebra is a critical variable in a student's decision to remain in higher mathematics.
- More pressure is placed on teachers when the expectation is that all students can and should learn algebra. (Learning algebra becomes a shared responsibility.)

The principal and staff were convinced that Algebra I should be taught to all regular and advanced academic eighth-grade classes. At West Baltimore Middle School, they believed that

- All students could learn algebra.
- Teachers were motivated and believed that the students could be successful.
- Parents would be supportive.
- The school system would approve the pilot project — The Algebra I Project.
- The needs of the school would be supplied (staff development, parent workshops, consultants, tutors, textbooks, etc.).

The WBMS set a goal to offer Algebra I to students in regular mathematics classes in addition to those in "advanced academic" classes. Discussions were held among SEMPREP partners (Center for Excellence in Science and Mathematics and MESA) and the staff of WBMS. The school prepared an assessment of their needs for the implementation of the Algebra I Project. After several planning meetings, the SEMPREP program agreed to the following guidelines:

- Provide financial support to purchase textbooks for classroom and home use.
- Provide workshops for teachers in
  — critical thinking

— problem solving
— use of manipulatives for mathematics instruction
— use of computers for mathematics instruction
— student anxiety
— integration of mathematics and science instruction

- Provide on-site assistance for teachers on a regular basis.
- Provide tutors for students identified by teachers as needing additional help beyond the classroom.
- Participate in orientation workshops for parents focusing on why we must challenge students to be successful in algebra in grade eight and the role parents can play to insure success.
- Provide speakers and field trips to motivate students and to share current and projected opportunities in mathematics, science, and engineering careers.

Although a major focus of the Algebra I Project was to provide a model for systemic changes with special emphasis on staff development, tutorial provisions for students, parental involvement, and preparation of appropriate curriculum materials, it was equally important to monitor the progress of students who take Algebra I in grade eight and their selection of mathematics and science courses pursued throughout their precollege career. Each student has been placed in the database that enables us to obtain the necessary information (name of senior high school attending, courses selected, grades, etc.) needed to encourage students to remain in the mathematics and science pipeline and to provide support for them when needed.

OUTCOMES

An examination of the 1992–1993 students' report cards revealed that in the regular classes the Algebra I grades appeared to be as high or higher than the physical science and English grades (see Figures 1 and 2). In the past, English grades were generally higher than Algebra I and physical science grades among advanced academic classes. Good attendance was a significant factor for good grades among all classes. Teachers, students, and parents remained positive about the program the entire year. It was apparent that everyone accepted algebra in grade eight as a reality.

The results of the SEMPREP project were shared with the Curriculum and Instruction Office of BCPS by SEMPREP and the WBMS staffs. The Algebra I Project was a demonstration of how quickly curricular changes can be made by school staff and parents. The project provided some basic guidelines for structuring the school system's "Algebra for Everyone, A Plan for Implementing the Study of Algebra in Grade Eight."

The goal of the Baltimore City plan is "to implement early learning and early adolescent years programs of mathematical study which will prepare all eighth-grade students to study Algebra I as a benchmark toward the goal of calculus study."

Phase I of the plan is preparation for change. Change involves

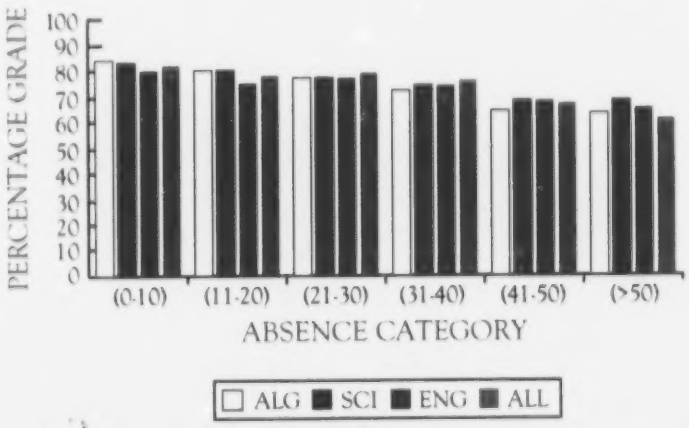
- Revising the early learning years to include algebra, geometry, measurement, data analysis, and probability and statistics.
- Offering all eighth graders Algebra I or Algebra IA.
- Providing teacher forums and presentations to counselors and principals.
- Training all eighth-grade teachers to use the Algebra I curriculum and the graphics calculators for algebra instruction.

Phase II involves managing the change during implementation. Concerns include

- Training teachers certified in level K–8 to have the depth and breadth to teach Algebra I.
- Providing sufficient textbooks for students.
- Continuing teacher training to accommodate the increase of students prepared to take geometry, Algebra II, trigonometry, analytic geometry, calculus, etc.
- Remaining dedicated to the options for students entering grade eight in September 1993.

Figure 3.

Student Performance — West Baltimore Middle School Algebra Project



WESTERN REGIONAL CONFERENCE

71

NATIONAL SCIENCE FOUNDATION

Comprehensive Regional Centers
for Minorities
(CRCMs)

Western Regional Conference

THE DATABASE MONITORING SYSTEM: MAKING IT WORK

Host: The University of Texas at El Paso

October 8–10, 1993

Participating CRCMs:

- California State University, Los Angeles
- New Mexico Highlands University
- Maricopa (Arizona) Community College
- University of Texas at San Antonio
- Montana State University
- University of Texas at El Paso

SCHEDULE AND AGENDA

Friday, October 8, 1993

5:30 – 6:30 p.m.
Conference Registration

6:30 p.m.
Convene in hotel lobby for trolley transport to special Welcoming Reception

7:00 p.m.
Welcoming Reception
Home of Dr. Diana Natalicio
President,
University of Texas at El Paso

Saturday, October 2, 1993 — OPENING PLENARY SESSION

7:30 a.m.
Convene in hotel lobby for trolley transport to University of Texas at El Paso Campus

8:00 – 8:30 a.m.
Registration and Continental Breakfast
Geology Reading Room

8:30 – 9:00 a.m.
Opening Plenary Session

Introduction

Dr. Stephen Riter
Dean, School of Engineering
University of Texas at El Paso
CRCM Principal Investigator

Greetings and Welcome

Dr. Diana Natalicio
President,
University of Texas at El Paso

Introduction of Conferees and National Science Foundation Officials

Dr. Betty Ruth Jones
CRCM Program Director
National Science Foundation

Dr. Costello Brown
CRCM Program Director
National Science Foundation

Remarks

Dr. Luther S. Williams
Assistant Director
Directorate for Education and Human Resources
National Science Foundation

Dr. Roosevelt Calbert
Director, Human Resource Development
National Science Foundation

9:00 – 9:15 a.m.
Purpose, Historical Perspectives, and Database Update

Dr. Betty Ruth Jones
Dr. Costello Brown

9:15 – 10:00 a.m.
Overview: The Minimum Obligatory Set (MOS) Revisited

Dr. Lloyd Richardson
CRCM Technical Assistant
University of Missouri

Mr. Carlos Reyes
Senior Analyst
Quantum Research Corporation

10:00 – 10:10 a.m.
Coffee Break

10:10 - Noon
Hands-on Working Sessions

Noon – 1:30 p.m.
Luncheon Session

Luncheon Keynote Address

Dr. Luther S. Williams

1:30 – 3:00 p.m.
Working Group Sessions
(continued)

3:00 – 3:10 p.m.
Coffee Break

3:10 – 4:40 p.m.
CRCM Project Presentations

6:00 p.m.
Convene in hotel lobby for trolley transport to Reception

6:15 – 7:00 p.m.
Reception
Home of Dr. Stephen Riter

7:00 – 7:15 p.m.
Trolley transport to Coronado Country Club

7:15 – 9:15 p.m.
Dinner Session

Keynote Address: Systemic Change Through Database Monitoring

Dr. Alfredo G. de los Santos, Jr.
Vice Chancellor for Educational Development
Maricopa Community College District
Phoenix, Arizona

Sunday, October 10, 1993 — PLENARY SESSION II

Plenary Session II
Camino Real Paso
Del Norte Hotel
Kohlberg Room

8:00 – 8:30 a.m.
Continental Breakfast

8:30 – 10:00 a.m.
CRCM Presentations

10:00 – 10:10 a.m.
Coffee Break

10:10 – 10:40 a.m.
Future Directions for the Database Monitoring System at the National Science Foundation

Dr. Susan Gross
Dr. Floraline Stevens
Program Directors
Division of Research, Evaluation and Dissemination
National Science Foundation

10:40 – Noon
Database Working Sessions
(wrap-up)

Noon
Conference Adjourns
Comprehensive Regional Centers for Minorities (CRCMs)

Comprehensive Regional Centers for Minorities (CRCMs) Project Presentations

SATURDAY, OCTOBER 9, 1993

3:10 – 3:40 p.m.
California State University, Los Angeles

3:40 – 4:10 p.m.
Montana State University

4:10 – 4:40 p.m.
New Mexico Highlands University

SUNDAY OCTOBER 10, 1993

8:30 – 9:00 a.m.
Maricopa Community College

9:00 – 9:30 a.m.
University of Texas at San Antonio

9:30 – 10:00 a.m.
University of Texas at El Paso

Western Opening Plenary Session

Western Opening Plenary Session—Continued

STEPHEN RITER
Dean, School of Engineering
University of Texas at El Paso

Today, I actually have two primary jobs. One is to try and keep everybody on schedule, and the second is to introduce my boss and the people at NSF to whom we all report.

The schedule is one that we really do have to pay attention to. It is tight, both programmatically and logistically. So if I, or some of the other folks here, appear a bit compulsive about staying on time, it is that we really cannot get everything done we need to do unless we keep moving along.

However, if there are any special needs any of you have—if you need us to help with some kind of arrangement, prepare some kind of material, get you in contact with someone or some organization—please let us know, and we will try our very best to make your stay here as pleasant as possible.

I believe last night I said hello to almost all of you. If I did not, please let me again give my warm welcome to all of you here and tell you how pleased we are to have you here on the campus of the University of Texas at El Paso (UTEP) and how much we are really committed to making this a productive day and a half.

Every time I can, I tell anybody who will listen to me that I personally cannot imagine a more exciting way that I could play out my own personal professional career than to be here at the University of Texas at El Paso, at this time in its life. Over the past half dozen years, I have had the good fortune to participate in its change from a kind of sleepy, relatively unnoticed place, with a rather narrow mission, to an institution which I honestly believe is trying to confront what I believe are the critical issues facing American education today: issues such as access, quality, and how an urban university such as this one interacts with a local community; in particular, how it interacts with the precollege education system.

Confronting these issues is a real challenge, and I honestly believe that this institution has proven to be a model for what a community-serving university of the future ought to look like.

Now, being part of this kind of experience has been both fun and rewarding, but the reality is that no institution—I think everybody in this room knows—can go through any kind of meaningful transition unless somewhere someone articulates a clear vision and provides the motivation and the wherewithal for the folks that really do the work to try and realize that vision.

It gives me great pleasure, therefore, to introduce to you our president, Dr. Diana Natalicio, a person who I believe has really made a lot of important moves in terms of making this a meaningful place and having an impact on education all over the country. Dr. Natalicio.

GREETINGS AND WELCOME

DIANA NATALICIO
President,
University of Texas at El Paso

Good morning and welcome again to the University of Texas at El Paso. We are very delighted to have you here. This conference really in many ways reflects the very strong commitment that this university has to all of the issues that Steve Riter mentioned a moment ago.

About six years ago, when I became president of UTEP, we were an institution that was looking for a role, for a mission. We had not figured out that our mission was right before our eyes and that it was in this community and with the young people who were depending on us for their futures.

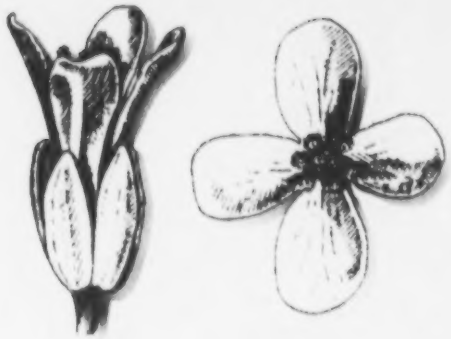
We have spent a great deal of time during the past six years articulating, conceptualizing, and disseminating our notions about what a university really can do to create opportunities for talented young people in its service area.

> *"We have had so many exciting opportunities, largely due to the support that has been provided by the National Science Foundation."*
>
> DIANA NATALICIO
> *President,*
> *University of Texas at El Paso*

We have had so many exciting opportunities, largely due to the support that has been provided by the National Science Foundation.

I say this even when Dr. Luther Williams, Dr. Roosevelt Calbert, and others are not within earshot. The fact is that about six years ago, when we started on our quest to define our authenticity and to figure out exactly what it was that we wanted to do, we looked around the horizon for the possible sources of support for this mission. There stood the National Science Foundation, in particular a program called RIMI, which offered us our first opportunity to begin to build our capacity as a resource for this region.

That program, and our first grant through that program, real-



ly got us started. It is interesting to note that grant was awarded to the geological sciences department, which was our only doctoral granting department at that time, and we are now in a facility that was renovated largely because of the fact that the National Science Foundation expressed a commitment to us. We were able to commit the University of Texas system and the state legislature to provide us with the funds that renovated this former library building into a fabulous facility for the geological sciences department.

The piece of equipment that was purchased with that first RIMI grant, the electron microprobe—and I know Dr. Calbert will remember that—sits on the first floor of this building and is now a very active part of our geological sciences research program.

I really believe that there is a lot of symbolism associated with this meeting today in this particular facility. Just to give you a little bit of information about the university: we have 17,000 students, 86 percent of whom come from El Paso County. Another 6 percent of our students come from Mexico and cross the border every day as commuters. That is about 1100 Mexican students. It is not so easy to cross the border today because there is a lot of interference from a lot of uniformed personnel. But the fact is that this has been a binational metropolitan area for a long time, and we see ourselves as having a very important role to play in northern Mexico.

The 1100 Mexican students who are enrolled at UTEP represent not only 6 percent of our student body, but 15 percent of all the Mexican nationals enrolled in higher education in the entire United States. Now if you think about that for just a moment, it is not surprising that we would have a large aggregation of Mexican students at UTEP. We are in a binational metropolitan area of 2 million, and you would expect some people to cross the bridge and come to UTEP. Historically, we have always had Mexican students enrolled here. But what is really staggering, I think, is the small number of Mexican students who are enrolled in U.S. higher education compared with, say, Japan, or China, or other countries in Asia.

We need to do something about that because Mexico is a neighbor, and the fact is we must begin to build the capacity of Mexico to be a real partner if this North American competitiveness that everybody seems to be talking about is going to become a reality. UTEP really does see itself as playing a key role there. We have many faculty members from universities and technological institutes in northern Mexico who are enrolled in graduate programs at UTEP at the present time, in order to go back and serve as agents of change and in building the capacity of their institutions.

Fewer than 15 percent of the faculty at universities and technological institutes in northern Mexico have any graduate degree at all, and we have got to begin to build that capacity. We cannot always simply create opportunities for Mexicans to study here. They must build their own institutions, and we are playing a role in that, too.

But the 86 percent of our students who come from El Paso County graduate from schools with which we currently have very strong ties. We learned very early that sitting back and waiting for students to come, just kind of picking up the survivors, if you will, of a system that was not really handling talent very well and certainly was not fostering its development, was not the way to go. So we have established very close ties with all of the school districts in this region, and with the community college, and we now enjoy a very productive relationship with all of them. We have something called the El Paso Collaborative for Academic Excellence, directed by Dr. Susana Navarro, through which we have done some beautiful work, in part supported by the CRCM program, to create more opportunities for young people in this region.

Nearly half of the El Paso High School students have traditionally dropped out of school before getting a diploma. That is talent that we can ill afford to squander, and we are very concerned about the fact that the have's and the have-not's in our society are beginning to diverge even further.

We are committed to the fact that universities like UTEP, and maybe all universities in the future, are going to have to think very seriously about the role they are going to play in creating opportunities for young people to develop their talent, because those young people do represent the future of this society.

We are excited about the successes that we have had through the collaborative and are very committed to the idea that we will do even better in the future. We understand, for example, that because 86 percent of our students come from El Paso County schools and because we produce about 80 percent of the teachers who are in those schools, we have a kind of closed loop which really can be controlled and which we can in effect enhance through our efforts. It is almost like a natural laboratory here, and we are determined to demonstrate that this can be done.

I spend a great deal of time myself in the schools. I visit

schools regularly in this community and I am always energized by the young people that I see there—the second graders whose bright eyes and smiling faces tell me that there is huge talent just waiting to be developed. But there is also a downside to those visits, because I know that, if we do not act and act swiftly and decisively, the promise of all of those young people is not going to be realized. We are working very hard at this, as I know many of you are in your own communities, and it is programs like CRCM that provide us with many of the resources that we need to accomplish this task.

So, I want to thank Dr. Williams and Dr. Calbert, and all the representatives of the National Science Foundation who are here with us, for everything that they do to conceptualize these programs and make them a reality in all of our settings. I also want to thank all of you from the other institutions that are participating in this conference for everything you do within your own sectors to make this country a better place to live for all young people. They deserve it, but most importantly, we all need them very much and we all must make a commitment to their development for our best interests and for the survival and for the prosperity of this country.

Thank you very much for being here. If there is anything that I can do during your visit, please let me know. I will be happy to help share our reality with you.

Thank you very much.

STEPHEN RITER: There has been an amazing change at NSF. NSF is still interested in basic science, but I think, even more importantly, it is starting to understand and realize that it has a major stake in other kinds of issues that are tangential and come in contact with the scientific process, in particular the development of people, and in particular the issues of access and diversity to which both Dr. Natalicio and I have already alluded.

Another issue is the health of the entire educational program, from preschool through the end of graduate school, as it affects the preparation of people for careers in science and engineering and people's ability to understand science and engineering. Certainly the changes over the past half-dozen years eclipse anything that happened in the previous nineteen.

When I talk to other people in the engineering field, other deans of engineering, and sometimes even engineering people associated with NSF, I learn that there still are pockets of people within that organization who yearn for the good old days, when those who knew best helped those who they thought needed help the most. What we now know is that the major emphasis for that change has come out of the directorate responsible for education and human resources and that their attempts to draw in people such as us have stimulated that diversification, that broadening of a mission and a responsibility. I feel privileged to have been a part, through my association with CRCM, of the change that is taking place. I think it is important for the engineering and scientific establishment of this country, even if they have to be dragged kicking and screaming into understanding that.

It gives me great pleasure to welcome all the NSF people here, to tell them that I am really proud and privileged to be associated with them. With that I now ask Dr. Costello Brown and Dr. Betty Jones from NSF to come up here to jointly introduce the rest of those persons who have played such a role in all these changes.

INTRODUCTION OF CONFEREES AND NATIONAL SCIENCE FOUNDATION OFFICIALS

BETTY RUTH JONES
CRCM Program Director
National Science Foundation

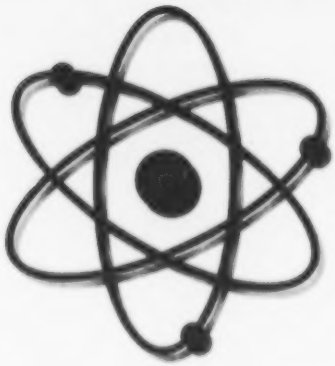
COSTELLO BROWN
CRCM Program Director
National Science Foundation

The remarks of Drs. Jones and Brown are detailed in the Opening Plenary Session of the Eastern Regional Conference, pp. 16.

OPENING PLENARY SESSION REMARKS

LUTHER S. WILLIAMS
Assistant Director,
Education and Human Resources
National Science Foundation

Thank you. I would like to join with Dr. Jones and Dr. Brown today in welcoming you to this very important event and in thanking Dr. Natalicio and others at the university for hosting it. I had the opportunity to visit with Dr. Natalicio and the university last May, and it seems like this visit in October is almost a continuum of the previous one. I say, without apologies, on my short list of the institutions that the Foundation has an awful lot of involvement with, one finds this very important institution.



Every time I hear a description of it, particularly about the Mexican nationals who are being served, it increases in significance. That is not to beg the question about a host of other institutions. I just want to make a few comments with respect to the larger significance of this exercise with which you will be involved in CRCM. There is a question of accountability, and that issue is not restricted to this program. You know as well as I that the major public policy drivers for how this country has invested resources from the early 1940's to date, has changed. Despite some brushfires here and there, I think it is unlikely that we will return to the previous situation. The previous situation obviously was one in which almost every investment that was made in this country was driven by national defense considerations. That is no longer the case, and the justifications have almost entirely moved to technology strategies that are designed to promote economic growth, and certainly at the national policy level almost everything that I am aware of includes enormous focus on the development of human resources.

I would argue that this leads to an opportunity for the population that we serve through CRCM, in a fashion that has never existed before. If you take a few minutes and think about what I just said, one could justify 92 percent of the country's expenditures on grounds that had absolutely nothing to do with human resource development. The remaining 8 percent, in a $76 billion fiscal year, means about $13 billion was devoted broadly to human resources and the attendant R&D. That situation has changed. The entire $76 billion is potentially available. It becomes very important, therefore, for programs such as CRCM that have made progress to have demonstrable success associated with them and that one is able to document that success—not only documentation for its own sake, but to actually use those outcomes. This is essentially the only way one is going to be able to make the case in the near term. I would argue certainly that one cannot make the case any longer on what I call equal opportunity considerations, that this should be done because the quota is right, but, rather, it is done because it is viewed as a strategic investment in the context of a host of other such investments. If, in fact, we had very robust, dynamic documentation of the activities of the CRCMs and we could employ those as models, I should think that it would be possible to compete for an appropriate share of resources that would enable us to engage the issue of human resource development, particularly as it bears on underrepresented populations, at the level that the problem deserves. Even before this transition, there have been at least some public policy drivers that made this very happy conversion of circumstances even more realistic.

What I am showing you in this viewgraph is the growth in resources for education and human resources within the National Science Foundation's budget, which for the past fiscal year is about $3 billion. Of that $3 billion, when one discounts the amount that is associated with salaries and expenses, and a host of other things that are not truly research and education, the budget really is reduced to about $2.6 billion. Of the $2.6 billion, nearly $600 million is devoted to education and human resources. As you will observe, as recently as three fiscal years past, that was a substantially reduced circumstance.

The question therefore—and it is within that nearly $600 million that CRCM and a host of other programs reside—is one of employing the programs that currently exist, documenting their success, and making the case to raise the resources that would enable us to mount the kind of operation that the young people of the country truly deserve. It is a very happy circumstance in my mind, because no longer do we have to actually attempt to make the case of human resource development in this instance vis-a-vis the next weapons system that is needed. The playing field is more accommodating, at least in terms of what we are trying to accomplish. Now I think we have little that is more important than to what this conference today is devoted.

Obviously you have very important programs. We have to be able to demonstrate to people in a variety of settings, who do not take that as a given, that this in fact is the case. And your current efforts, therefore, have the possibility of being employed as a vehicle to generate the resources and the resultant activities that will serve students in general to the level that is appropriate.

I look forward to your deliberations. I sat through the sessions in Baltimore last weekend and I found them very interesting.

Thank you.

ROOSEVELT CALBERT
Director, Division of Human Resource Development
National Science Foundation

COSTELLO BROWN: In the beginning of NSF, there would have been no way that we would have been able to have a CRCM program or any of the other programs. So, earlier programs had to be done in the context of research. If you look very closely

at Dr. Calbert, you will see a few scars here and there that came about during his 20 years at NSF, and helping us to mount those minority programs.

ROOSEVELT CALBERT: Thank you very much, Dr. Brown. Let me say while the graphics are up on the screen, you should notice that between 1991 and 1994 there is almost a doubling of the budgets Dr. Williams has spent at NSF in terms of education and human resources.

Now those of you who know NSF comprehend that the research directorates and divisions do not take this very kindly, and that is why Dr. Williams insists upon this whole business of being accountable. He would like to increase the EHR budget even more, but that can be done only if you help us, by showing that these kinds of programs do work.

So, let me thank all of the persons who are involved in making this conference a reality. I give you a very hearty thank you from the National Science Foundation and to those who are here visiting as well; it could not happen without you here, and you are showing today your concern in this whole effort.

I am sorry that Dr. Jewel Cobb stepped out for a moment because she served on the National Science Board. For those of you who do not know, the National Science Board is the policy-making body of NSF.

She remembers my walking up and down the halls and saying, "Let us make a difference," by investing in institutions that have large minority enrollments. Dr. Cobb was an ally during that time, and maybe some time you ought to ask her about what happened during those early years.

Dr. Natalicio mentioned UTEP's acquisition of the electron microprobe. I remember very well when that award was made. An award was made on the basis of merit review, of course. It went through a review process and reviewed very well. There were still those, however, who would ask why UTEP should receive such an expensive piece of equipment when there were only a few of them in the whole nation? NSF asked the question: Why not?

That is the whole philosophy we are talking about here today. All of the institutions represented here today must realize that you have a major responsibility to take your place in the American system of higher education, to make things happen for students, especially those students who are significantly underrepresented in science, engineering, and mathematics.

Many of you remember the early days of this program. We met in places such as Puerto Rico, or Chicago, and we talked about the elusive issue of evaluation, of having accountability. And in that vein, I would like for us to just take a moment of silence to pay tribute to one of our fallen colleagues, who is no longer with us, Dr. Theodore Reid—most of us knew him as Ted.

Today represents still another time, or transition in CRCM's history. The first two projects that were established in 1988 have finished their first five years in this program. In Fiscal Year 1994, four additional projects will complete their fifth year in the program during this transitional period. The CRCM program has evolved from projects that consisted mainly of discrete enrichment activities for a few students to projects that are now systematically addressing problems and barriers for thousands and thousands of students in both urban and rural environments. This period also represents a time for reflection, in terms of our expectations and goals; and resources are getting scarcer.

We must ask ourselves, what have we accomplished in the past five years? What really works and what does not? What partnerships work best? Is it a partnership among Federal agencies, institutions of higher learning, school districts, and private organizations? Among parents, teachers, administrators, and the private sector? These are questions we would like to answer in Fiscal Year 1994, and today marks the beginning of finding answers to these critical issues. The first five years have been a learning experience for all of us. We think we have made a great deal of progress, but we must do more and document it.

We are setting things in place. We are putting in place an infrastructure. So let us get the good news to the newspapers.

> *"All of the institutions represented here today must realize that you have a major responsibility to take your place in the American system of higher education, to make things happen for students, especially those students who are significantly underrepresented in science, engineering, and mathematics."*
>
> ROOSEVELT CALBERT
> *Director, Division of Human Resource Development*
> *National Science Foundation*

Now, we still realize that the task of improving precollege mathematics and science education for minority students is difficult, and there are no immediate solutions that will operate equally well in all school districts. You have been diligent in your efforts thus far, and you must continue in partnership with the National Science Foundation, other Federal agencies, the private sector, and others.

Now, one thing that I must say in closing. You remember in the Bible about Lot's wife being

warned about looking back. She did it anyway, and you know what the consequences are. One thing I think, as Dr. Natalicio knows, is that once the process started at the University of Texas at El Paso, we never looked back. I implore you, that as we go through this process today, and into the future—never look back. Thank you.

LUTHER WILLIAMS: Satchel Page, who was a great baseball pitcher, says he does not look back because you never can tell what is gaining on you. It might be catching you.

PURPOSE, HISTORICAL PERSPECTIVE, AND DATABASE UPDATE

BETTY RUTH JONES
CRCM Program Director
National Science Foundation

COSTELLO BROWN
CRCM Program Director
National Science Foundation

BETTY RUTH JONES: So why are we here? The overall purpose of this particular conference, the Western Regional Database Conference, is to introduce and to provide an update of some of the new and revised changes in our database system. I do not think these changes are extensive changes. I think they are rather minor changes, as Dr. Richardson will probably indicate to you when he comes forward.

We have allowed time in the program for some hands-on equipment. We have a computer set up over here, so if anyone has a diskette, or if anyone wants to go into a practice session, or come back later tonight, the computer will be available for that. We will have work and practice sessions, and these will be directed by Dr. Richardson. I think he will give us a little test. We will have discussions and see if we are going to get the right answer.

We are very pleased that you will be making presentations tomorrow on how the database system is being utilized in your own program, and I think you have taken maybe your most successful program and you are going to show us how it is really working. We are very pleased about that. We are also pleased that we are trying to get to the point of publishing our MOS system, our Minimum Obligatory Set.

We have gone through a series of meetings, which I think started in 1989, as Dr. Brown will tell you when he gives you the update on the historical perspectives, and we now feel that we are getting very close to publishing the MOS. We are very pleased that you have prepared working papers—and I emphasize working papers—that you will be presenting to me. I know you are very anxious to give them to me. We hope that we will be able to publish them in our conference proceedings. We will be talking about those papers later on during this particular term.

We think that this conference is significant because it is good to get the Western group together, to just come together as a group with your PIs, with the data analysts, and the specialists, so we can all sit in one room. It is good that we can exchange ideas and concerns as they relate to the database monitoring system. We are very pleased that Dr. Williams could join us, as well as Dr. Natalicio. And we are very pleased that the division director of HRD, Dr. Calbert, will be sitting through the sessions with us.

So, it is good just to come together and to exchange ideas and concerns along with the evaluators, the data analysts, and the project directors. We also further think that this conference is significant because it exemplifies the productivity and the success of the CRCM tracking and monitoring system. It shows how it is being utilized in your respective projects, and also it provides an understanding of how the database system can be further enhanced for the continued success of your programs.

At this time Dr. Brown will come forward, and give us a bit of the history as to how we got started and some of the sites that have occurred in terms of meetings, and bring us up to par as to where we are now. Dr. Brown.

COSTELLO BROWN: I would like to start by saying that, whenever you start to put together any type of database system, it has to do a number of things. It has to give the project itself the information on what is working and what is not working. It has to provide to the Foundation information that we can use collectively to demonstrate the overall effectiveness of the program, and basically, we want to be able to take a student in the fourth or fifth grade, put the student's data in the database with all of the important information, profile the student, and follow that student's progress all the way through until he or she is in college, so we know what worked and what did not work and with which programs they were involved.

The development of something like this is more than just a database, and it started actually in 1989. Some of you were there when it was first proposed that you put together some type of system that would allow for the monitoring. I just listed the sites where a number of these meetings were held. The discussions oftentimes got very—Dr. Richardson would say—excited. When the discus-

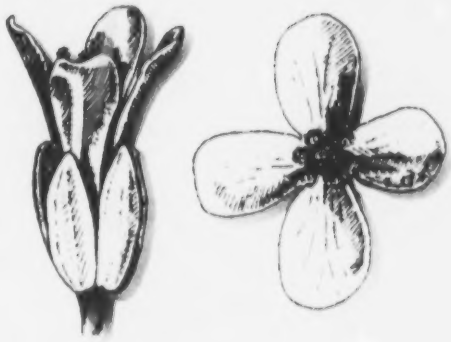
sions began, the participants were talking about as many as 300 different variables. I see Leticia (Ms. Díaz-Ríos) nodding her head. If you could imagine 300 variables—and we are talking only about the student database now—on what is to go in about a given student. Start multiplying that. By now, some of you have as many as two to three thousand students. You are talking about spending all of your time on the database. Somewhere in there, there had to be a compromise—what is important, what is not important, what is most important. So this now has been reduced.

In Puerto Rico, they decided that it was going to be a minimum obligatory set of data—the MOS—and that is where the term MOS was first coined. It is probably still not finished and probably will not be, and what we will be doing today is introducing some of the changes. I see some of you shaking your head when you start thinking of changes now. We have tried to improve. We have collected data for the last couple of years and have gone through a lot of growing pains with that data, going back and forth, trying to clean it up.

We had disks that people said had everything on it; when we received the disk it was blank. So we had to go from blank disks to disks that actually gave data that would enable us to collectively put it all together. So we hope that now we are at a point where we can start to make progress. We are not going to look back, and we are going to go from this point onward. When they first started, the Division of Research, Evaluation, and Dissemination was not even in existence. Now we have a division that is dedicated to that, and Dr. Stevens and Dr. Sue Gross—Dr. Stevens is here—have been working with us on evaluation.

Some of us did not even know how to spell that word when we first started. We are learning that it starts with an "E," anyway. We have gotten that far.

I would like to now go ahead and introduce Dr. Richardson, who will provide an overview of the system. One of the things we have learned: Whenever we start talking about the database, the questions never stop. We always put this at the end.



OVERVIEW: THE MINIMUM OBLIGATORY SET (MOS) REVISITED

LLOYD RICHARDSON
CRCM Technical Assistant
University of Missouri

CARLOS REYES
Senior Analyst
Quantum Research Corporation

Dr. Richardson's remarks are detailed in the Opening Plenary Session of the Eastern Regional Conference, pp 19.

LUNCHEON SESSION

KEYNOTE ADDRESS

LUTHER S. WILLIAMS
Assistant Director,
Education and Human Resources
National Science Foundation

I am pleased to join you at this Western Regional Conference addressing strategies and processes to achieve greater accountability in the Comprehensive Regional Centers for Minorities (CRCM) Program. This conference is not called as a forum for unabridged recitations of generalities and vague possibilities of promised achievements or all encompassing laments of the cumulative results of organizational or structural inequities. Rather, it is designed to collectively instruct the next endeavor in a growing series of efforts to enhance the specificity of CRCM programming and the predictability of student outcomes. The task at hand is to identify areas the individual CRCM programs have in common as well as the differences between them that will lead to strategic addresses of an even more successful CRCM enterprise as it bears on math and science K–12 education of ethnic/racial minorities underrepresented in the scientific and technical affairs of the Nation and the international community.

The complete text of Dr. Williams' remarks is printed as part of the Eastern Conference proceedings on pp. 27.

AWARDS PRESENTATION

Dr. Williams and Dr. Calbert were both presented a book entitled "Riders Across the Centuries: Horsemen of the Spanish Borderlands" by the President of the University of Texas at El Paso, Dr. Diana Natalicio.

Western Dinner Session

INTRODUCTION

STEPHEN RITER
Dean, School of Engineering
University of Texas at El Paso

Again, let me say that I hope this has been a productive day for everybody. It has been a productive day for me. We wanted to conclude this day before we went on to the next one with a formal presentation. We are fortunate that our speaker tonight is Dr. Alfredo de los Santos. Dr. de los Santos, to those of us here in El Paso, is a particularly important person because he is the founding president of El Paso Community College, an institution of great importance to this region, and with whom this university, the University of Texas at El Paso, enjoys a particularly close and meaningful relationship.

I said something about that to Dr. de los Santos, and he said, "I started in a closet with a filing cabinet. You cannot make too big a deal about it." But in the interim, under his direction, the college got off to a wonderful start and is now a major influence on education in the El Paso region, and I cannot think of anything that would make any of us any prouder than of having created an entity like that. I think all of us here in El Paso are appreciative of you.

To those of you who are involved in CRCM, Dr. de los Santos does not need any kind of introduction. I think he is perhaps the most dynamic, articulate spokesman for our program from outside the National Science Foundation. I have heard him speak on a number of occasions about what he has done, but most importantly, what we all have done to advance the cause of opening up education to as many people as possible in all of our individual areas.

With that, I would like to turn it over to him and let him tell us a little bit about his thoughts on all these and related issues. Dr. de los Santos.

KEYNOTE ADDRESS: SYSTEMIC CHANGE THROUGH DATABASE MONITORING

ALFREDO G. DE LOS SANTOS, JR.
Vice Chancellor for
Educational Development
Maricopa Community
College District

Thank you. It is a pleasure for me to return to El Paso, where I have enjoyed perhaps the most rewarding of all my professional experiences. It is always good for me to come back and see how the city has grown, how it has changed, and yet how it has remained the same.

El Paso, as Dr. Natalicio and others have told us, is a wonderful city because it really is the point of confluence of many different cultures. If you live in El Paso, you experience that wonderful mix of native cultures that are here, the Spaniards, the American culture, and the Mexican culture.

It is also very good for me to come back to see friends whom I have known and worked with for a long period of time. Dr. Natalicio came, as she said, in 1972, and after she arrived here as a visiting professor, she taught part-time at El Paso Community College. We have been friends since then.

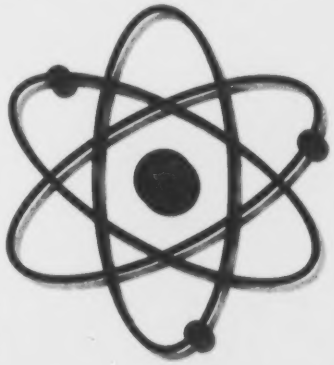
The new president of the community college is a very good friend, and I have friends here that go back for years and years. Every time I come, I meet new friends.

I am going to talk tonight about how we, in the three years that I have worked with the National Science Foundation and CRCM, have put together our data systems and used them to make decisions to increase the impact that we have in the public schools in our own system, to carry out systemic change.

This morning, Dr. Calbert said that in the past few years, the focus of the CRCM Program has changed. The initial focus of CRCM was on discrete programs that provided services to a small number of students, but now the focus is on a large enterprise that tries to change the system, to create systemic change, so that an ever-growing number of students who have been underrepresented in the fields of science, engineering, and mathematics will be prepared to pursue those options.

Well, we applied for and were awarded a CRCM grant in the prior definition, and we went through wrenching decisions when people at NSF, led by Dr. Williams and Dr. Calbert and Dr. Brown and others, began talking about systemic change. We did not know what systemic change was about, to be very frank with you.

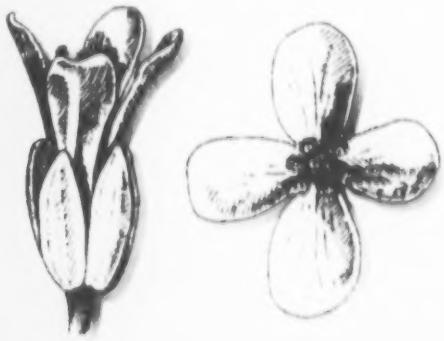
We looked at the literature, and people were talking nonsense. What they were discussing was too theoretical, it was conceptual,



and when we tried to apply those concepts to our reality we could not. So I embarked on a search-and-find mission by asking Ted Reid, who was then the program officer for CRCM, Dr. Brown, but most importantly, Dr. Williams, and I am sorry that he is not here today, so that he can listen to what I am about to say. Every time I went to a conference or to a meeting, or had an appointment with Dr. Williams, I asked him what he meant by systemic change. It was from a series of conversations with him and members of the CRCM program staff that we came up with the four components of systemic change.

It began with a definition of very specific outcomes. The first part, then, has to do with the expectation that the program would have outcomes that are stated very specifically with a lot of precision, and in quantitative terms that can be measured.

Dr. Williams at that time used terms like "inelastic." That is, he was inflexible in his requirement that we have quantitative objectives. He used the term "absolute." That is, you have to have an absolute requirement of



specific outcomes. With that—and we heard him mention this in his remarks this morning—a concomitant part of outcomes is the accountability that expectation implies. That is, the institution that is proposing to the National Science Foundation to do something under CRCM rubrics has to have not only a specific set of objectives, but also an institutional commitment to meet those objectives: to accept responsibility, to be accountable to work, and to commit resources on the part of the institution to meet the outcomes. That also implies that the institution has to have in place the mechanisms to collect and analyze and use the data to prove whether or not the objectives have been met.

This morning, Dr. Williams used the word "demonstrable," a term to define whether or not those objectives have been met. So our first definition of systemic change is a very clear statement in quantitative terms of what your outcomes are going to be. It is an assumption of responsibility that you are held accountable to meet. Then the systems, the process that you need to collect the data that you will need to demonstrate whether or not you have met the objectives, will have to be put into place. The second part of that, our definition, was again based on a series of conversations. You must have an appropriate approach to solve the problems.

In our instance, since we received assistance from the technical advisory team that the National Science Foundation appointed and also from a national advisory committee, the terms that we used to define appropriate approaches to the problem are that the program has to be comprehensive; that it has to have a continuum, a relationship, an articulation to the progress that you have; and that these activities have to be very well coordinated and articulated. Our national advisory committee told us that we ought to add another "c" to continuum and comprehensive; that is, we must cluster the schools. In our instance, it means that we will work with the elementary schools that feed the middle schools and high schools, that ultimately feed the community college or the university, so that we funnel our students through a series of continuous, comprehensive activities.

The third definition, then, is scale and scope. That is, the number of target populations that CRCM seeks to serve must be of a sufficient size, and the model must be such that we can learn from the experience and share what we learn with others, so that, we hope, it can be replicated in other settings; at least those parts that make sense for those other settings.

Finally, perhaps the most important part, is what the impact is of all of our activities on the educational system. What is it that happens in the classroom and what are the services, the component units, that is, the elementary schools, the middle schools, the high schools, the community colleges, toward the continuum of student services that these institutions provide to create a seamless web of services and programs so our students can move from one level to the other without being cognizant of the barriers that exist?

Given the definitions, then, of specific outcomes and accountability, and the need to develop a system to collect data and develop appropriate approaches to the problem, and the impact of the educational system on two levels, whatever is in the classroom and the services that are provided—we developed in effect the idea that has come to be the Maricopa County Comprehensive Regional Center for Minorities.

I want to share with you 11 slides that try to define how we are structured, how we define the data, and how we use the data to make changes in our system. We have structured the system in Maricopa around four general

concepts of collaboration, articulation, tracking, and intervention, and we monitor the data that we have to make changes in any one of those four general areas. I have been talking to some of you at this meeting about the relationship that existed before CRCM. Just at dinner, I was discussing with Jewel the fact that we would not have applied to the National Science Foundation to create the CRCM in Phoenix if the steering committee of the think tank had not approved it.

We have been working since the middle 1980's with the superintendents of the school districts in urban Phoenix, in what we called the think tank, to deal with the problems that urban school districts face. The best way that I can describe it is what our chancellor described as his vision of a Phoenix think tank and that is to find uncommon solutions to common problems—common in that they were found everywhere, and common in that the problems that affected the public schools would ultimately affect us.

We have, as I mentioned earlier, a seamless web concept. In fact, we have a program with a graduate dean at Arizona State University that we call "the seamless web." We begin working with students within the community college, and our intent is to get them through the Baccalaureate degree in the minimum amount of time, without any barriers to their progress. We have a wonderful relationship with Arizona State University. I was telling Dr. Riter that the majority of the students who are in the junior and senior levels at Arizona State University were former students of ours, and fully a third of the Baccalaureate graduates were former students of ours.

We have incredible relations with the school districts that are part of the CRCM network, and "A's" is an example of a program that begins work. An "A" in our system means achieving a college education. You take the students who are in the middle of their graduating class, the second and third quarters. We begin working with them at the sophomore level and work with them through the junior and senior levels, so that we create a seamless web for them. That program, incidentally, is a lot older than CRCM, and we have a 92-percent success ratio with those students.

What we have done is to establish very close collaborative, working relationships among the public schools. It is here, through this process, that we define what our objectives are going to be, that we quantify them, and that each institution assumes responsibility and becomes accountable for what their contributions are going to be.

We developed a system of managing data that goes way beyond what the MOS does. The MOS really has the student data, the teacher data, and the activities data. We have added three other components to it. We use a UNIX platform, a relational database that is very flexible. We can query the data relating any element, anywhere in the database, to ask questions that we can use to make decisions. It is a system that we have found to be very useful. We provide, for example, the high school and junior high school principals the list of the students in the winter that will transfer from the eighth to the ninth grade and are waiting to take Algebra I. This part of it is wonderful for us, because from our point of view, these data provide us with the answers that we need to make decisions.

The second part is articulation, which in this instance means a lot of things. We work with the state Department of Education, for example. Arizona is one of the few states that has statewide objectives, a framework we call it, for mathematics and science, K–12.

Dr. Williams was talking about the fact that we do not have K–12 systems for math and science. Well, in Arizona at least we have the framework, and we have a statewide student assessment program that is beginning to work to help us know whether or not we will achieve those objectives. We have wonderful relationships with the public schools. I know all the superintendents in the county and about a third of the high school principals. We host at least two meetings with the principals, the directors of mathematics and science, the curriculum specialists, in the fall and in the winter, to tell them what we have accomplished with CRCM and to provide information to them of what our objectives are going to be.

> *"Let me give you a couple of examples of what it is that we have done, some of the ways that we have monitored the data to make decisions about systemic change."*
>
> ALFREDO G. DE LOS SANTOS, JR.
> *Vice Chancellor for Educational Development*
> *Maricopa Community College District*

I use the term "vertically articulated curriculum" to define what our objectives are in the CRCM, to define a continuum of curriculum, so that students will be able to move, and when they leave one part of the system, the skills that they have will be the entry criteria for the next level in the system. We have a long way to go, but we have come a long way.

The CRCM provides, as you will soon know, programs for teachers, students, and parents. We help them change the curriculum. We should also mention that we provide materials for them, supplies that sometimes the school districts cannot afford to buy, and we distribute reports to the principals and superintendents about the achievement of the students and the participation of their teachers. The cluster

schools, that is, the public schools that work with us, provide financial support: their own district money, Title II money, Eisenhower money. They help us track the students. Other school districts, for example, also provided transportation that a year or two before we had provided. They also help us distribute information about CRCM, not only to the students but to the parents and to their teachers.

> *"We have a foundation part of the program where we really want them to master the arithmetic concepts. Our focus has been to prepare the students, so they will have the foundation of arithmetic competence. At the fifth, sixth, seventh, and eighth grades, we begin to teach them algebraic concepts."*
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Perhaps the most important part is what we refer to as intervention. Again, I am going to repeat three terms that I tried to define earlier. One term is "cluster." If we cluster our schools so that students move from one level to the other in their own neighborhood, we have a very comprehensive program, and we have designed the program so that it is a continuum. And I am going to refer to the continuum a little bit more. Our intervention programs are intrusive, and they are inclusive. That is, we want the parents to force their kids to take mathematics, to take algebra at the eighth-grade level and at the ninth-grade level, so that when they leave high school they will have taken calculus, or they will be calculus-ready. It is here—and I refer back to our definition of systemic change—it is here that we come to the definition of appropriate approaches to the problem.

We have defined a number of programs that are specifically designed for teachers, for students, and for parents. We believe that the way we affect the educational system, by having an impact on what happens in the classroom, is by doing what we do with and for teachers. We teach them content by using the pedagogues that we have decided are the best, given our situation. Then we teach the teachers how to use that pedagogy to teach the content. Then we teach them how to work with the students that CRCM has as a target group.

Now, we have a continuum of programs for students where we also involve the parents. Going back to the impact that we have in the system, by changing what happens in the classroom, you will notice that there is an asterisk. We do not do something with students and for students, and for parents and to parents, without preparing the people who are going to do it. In almost every instance you will see that we provide training to the teachers who are going to provide the CRCM services. So our design then is to change what the teachers do, so they, in turn, can change the classroom.

Let me give you a couple of examples of what it is that we have done, some of the ways that we have monitored the data to make decisions by systemic change.

We have a program called "E to the nth Power." That is "Excellence to the nth Power." We have these clubs for college students—our original idea was to get college students who are sophomores, juniors, and seniors—that would prepare them. Then, they would go to the elementary and junior high schools, and they would have an extended day program, teaching students algebraic concepts, or algebra, depending on their level. We found a number of things that led us to change the program. Number one was that the college students left us—that is, we had a large attrition rate, and it took a lot of time to train the next group of students. It also cost a lot of administrative money because it was an extended day program. It was also heavy on the children who had to stay after school. Notwithstanding was the fact that both the college students and the children who were being taught loved the program. We were having no impact in the curriculum and no impact on the teachers. So what we did was—based on the data that we collected, and the experience that we had—change the system so "E to the nth Algebra Club" is now an integral part of the day program. We prepared the teachers, and we gave them the kits that they needed in order to teach algebraic concepts.

If you look on the far left, the top program there is "High School Math Project." There has been a movement in the Phoenix area to redesign the way mathematics is taught to what is called "integrated" mathematics.

It began a couple of years ago, when a group of high schools came to us and said they were interested in that. It is an integrated block program where students go through a mathematics course. They do not take algebra, prealgebra, trigonometry, geometry, precalculus, calculus, et cetera. It is just a three-year block where they are taught a number of things, even beyond what we now teach in the discrete courses. With the leadership provided by Ms. Nora Ramirez, we prepared more than 30 teachers working in 15 high schools, so that integrated mathematics can become a reality. Without the resources of the CRCM, we would have a difficult time doing it.

Again, this is our attempt to respond in an active way to the need to provide systemic change.

The next slide talks about three continuum. It goes back to our tracking system and back to our objectives. We maintain tracking, in addition to the six components that I mentioned, that make up our C–3 system, by the academic progress that students make, by the participation by program, and by geographic location. We are interested in a continuum of activities based on a continuum of assessment, that is based on a continuum of access. If you will go to the next slide, we will show you the design of the activities that we provide for students. We begin working at the kindergarten level where we provide, really, a minimum amount of instruction to parents and children in families achieving mathematics excellence and families achieving science excellence. Things become a little bit more serious when we provide hands-on science and "E to the nth" algebra at the fourth- and fifth-grade levels.

Ms. Nancy McAllister was telling me that we now have students in the fourth and fifth grades who are beginning to do algebra, which is, you know, very difficult for some people to understand. We were talking earlier about the expectations that people have, and it is interesting to watch the children learn so early on.

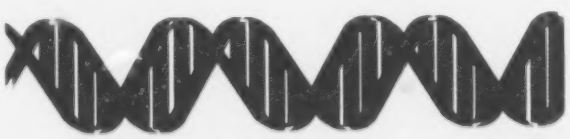
We have a foundation part of the program where we really want them to master the arithmetic concepts. Our focus has been to prepare the students, so they will have the foundation of arithmetic competence. At the fifth, sixth, seventh, and eighth grades, we begin to teach them algebraic concepts.

Now, the last slide shows that we want to have a continuum of activities, based on a continuum of access, based on a continuum of assessment, given our definition of systemic change. We begin with student objectives, an acceptance of the responsibility and accountability to meet those objectives, an institutional commitment of resources and facilities, et cetera, to meet those objectives, with appropriate approaches to the problem.

We monitor the data and make decisions, based on the data, on whether or not our programs are appropriate. As I have indicated, we have changed some. I gave you an example of something that we added and something that we changed. We have begun, I think in Phoenix, by using the definition that we gleaned from discussions with NSF staff, to begin the process of systemic change. It has been for us a very difficult effort, but it has been made easier by the collaborative relationships that we have had with the community of learners who we have worked with for so long. We are pleased with the work that we have done today, but we know that we have a lot of work still to do. We are hopeful that the work that we have done has changed the mind-set of people in the mathematics and science departments, but most importantly, what happens in the classroom.

We have not yet dealt systemically with the questions of the student services that I alluded to earlier. The questions that I raised with my colleagues in the think tank, and the CRCM network, were very simple questions. The questions were: "Who in the junior high school is responsible for ensuring that the students who graduate from the eighth grade enroll in the ninth grade? Who in the ninth grade is responsible to receive the students, and who in the ninth grade is responsible to make sure that the students take the right sequence of courses?" The response was, "Nobody." I raised the question for my colleagues at the community college, "Who in the community is responsible for ensuring that all the high school graduates apply for admission to an institution of higher education?" The response was: "That's not my job, man." We asked the high school principals and the counselors: "Who is responsible for making sure that every kid who graduates from high school applies to college admissions? Who is responsible for making sure that they apply for financial aid?" The response is, "Nobody." In the near future we will begin to deal with those questions.

In the meantime, the work that CRCM has accomplished in a short three years has been inspiring, based on the responses that we had from the superintendents, the principals, the curriculum directors, the directors of mathematics and science, the master teacher for mathematics in small school districts—most importantly from the teachers and the children and the parents of the children—we have begun the process.



Western Closing Plenary Session

FUTURE DIRECTIONS FOR THE DATABASE MONITORING SYSTEMS AT THE NATIONAL SCIENCE FOUNDATION

FLORALINE STEVENS
Program Director, Research, Evaluation, and Dissemination
National Science Foundation

I really have two tasks this morning. As you can see in the program, another person would have been talking with you about the database, and I would have been talking about evaluation. There is a change. I have been called upon to also share with you information about what is happening with the database.

Let me explain. We are not in the Division of Human Resource Development, but we are intimately aligned with the work they do. We have divided our task from the Division of Research, Evaluation, and Dissemination into database support and evaluation support.

First, I would like to discuss the database support. We are doing the same things that you are doing in EHR; we are building a database that will be useful for the types of information that we need at NSF in the EHR directorate.

If you look at the deep green portion of that circle, these are the pieces or types of information that are currently in our NSF mainframe databases. We have information about awards and proposals, financial data, and principal investigators. We also have institutional information on where the principal investigators come from, and we have the abstracts of the proposed research. That is all in the database right now. Mr. Carlos Reyes has been working with us in the development of what we call the EHR impact database, which is not on the mainframe.

What we have now are mainly quantitative data showing program impacts, and coming from that is the CRCM MOS information that feeds into the database. We have also responded to the request for information about the annual report. We can produce that information, and the descriptions that you have are what we anticipate we will be doing in continued cooperation. We are talking about adding a database for the PMSA project. We are also considering adding a database of persons with disabilities.

So we are growing. Down at the bottom is an area that we have not done as much with, although some of you in your projects have done more. That is the qualitative data, where we talk about questionnaires and surveys and things of that nature.

We anticipate this kind of information coming in from the CRCM annual reports and the AMP annual reports. This is our database.

If you look at the impact database, you can see that we have concentrated most of our services with HRD, Human Resource Development. There are other divisions in the EHR Directorate. There are the undergraduate education; graduate education, research, and development; elementary, secondary, and informal science education, the division where I am; and one we have heard a lot about—the urban initiatives, which are the statewide systemic initiatives coming out of the Office of Systemic Reform. All of these groups within EHR will have a tremendous effect on the EHR impact database. This is going to be a lot of work. It is evolving, and it is not there yet. But as I mentioned before, we seem to be the most cooperative or the most responsive at this time to the needs of the Human Resource Development Division.

Now, Mr. Reyes has passed out to you a packet of information for your particular CRCM. I have four letters that I would like to say: "GI/GO." For those of you who are in database management, or data analysis, you know what that means. For those of you who do not, GI means "garbage in." GO means "garbage out." If you look at your reports, these are the data that you provided to NSF, and if it looks a little strange, then consider the source.

I do not say that to be mean. Dr. Richardson was talking yesterday about where we put data in the database, and when we bring the data output out, then it really shows up where things look funny. When you are talking about student data, you find information that relates to teachers, then you realize that someone erred in the decision to report information in that particular data element.

We have an internal contractor, Copyware, and we also have Mr. Carlos Reyes' group that is contracted to work with us and to work with you. All of those people have to come together. Ms. Griselio Moranda has that horrible task of bringing everyone together to

make the databases work. It is difficult, and we know and recognize it. As we say this on the broad level at NSF, we understand and are sympathetic to what you are going through in your efforts to bring your databases up, and also to respond to NSF's request for information in relation to the annual reports and the other kind of information that you will be asked to submit.

I want to refer back to what Dr. Williams talked about yesterday; he has a marvelous way of expressing himself. I am sometimes a bit more blunt. When we talk about databases and the information that we expect to get from you, we are really talking about an element of accountability. NSF gives out a tremendous amount of money. I think some-

> *"You need to know the audiences for the information coming from your project, and you need to know what they want to know."*
>
> FLORALINE STEVENS
> *Program Director, Research, Evaluation, and Dissemination*
> *National Science Foundation*

one said, "Bang for the buck." NSF says, in effect, that we have given you all of this money; now prove to us that this money really has had the kind of impact that we expected it to have, because in your proposal to get the funding you promised that certain things were going to happen for the benefit of minority students.

So the database information that comes in is answering the questions: "Did you do it?" "What was your impact?" "Did you really deliver what you wanted to deliver?" The annual reports really contain the impact information, what I would call more summative type of information coming from you to us. We realize that there are other types of information that should be tremendously important to you, and that is when we get into the area of project evaluation. We saw some instances of formative types of information that you use to improve your project and to make sure that, when you report your impact data, you really have had an opportunity to make sure that you are going to be successful. NSF wants you to be successful; they do not want you to fail. Although you have a MOS that has the elements common to all of your projects, if you are collecting information only on the MOS, then you are not going to get the kinds of information that you want to be successful. I will say that again. If you are limiting yourselves to collecting information only for the MOS, you are not going to get information that you will need to be completely successful.

In addition to turning in annual reports to EHR, you should, for each project, be developing an annual evaluation report about what your project is doing, such as the kinds of questions you ask the students about what is happening to them. You are talking with teachers and asking them about the impact of their in-service training. You are asking teachers whether they are taking what they have had in their training back to their classrooms. Did they find it to be successful? Or did their assessments match my hands-on activities? Did they in any way uplift what it was that a student was supposed to learn? The bottom line that NSF wants to know, were these students successful enough from these experiences in this year to move on to the next year? When we talk about pipeline, we have to talk about the elements or the conditions that help students move through the pipeline. If you heard Dr. Williams talk yesterday, you heard that the ultimate goal is for these students to go to college and to be successful in college, and that, we hope, they will move all the way up to a doctorate in science, mathematics, or engineering.

In following that pipeline and looking at those conditions that facilitate or thwart those efforts and in gathering information to look at your particular project from year to year, you are going to have difficulty in tracking and being able to say what you did, how you did it, and how well you did it. Now you can have goals; you can have objectives. Sometimes you are not able to meet them, and there are a lot of conditions that determine why you could not meet them in this particular year or time. But you are also able to make plans to modify and eliminate some things that really are not doing what you want to do. You find that out only through evaluation. The most important thing to realize is who are in your evaluation audiences. You have one major audience for CRCM. Can someone tell me who that major audience is? I would like to hear it from all of you, please. Can you say it a little louder?

NSF is your major audience. But that does not mean that NSF is your only audience. It might also be the people who are collaborating with you, the other institutions that are collaborating with you, or the school districts. And as I heard from some of you, you are giving reports back to the school districts on how their students are doing. This is important. You need to know the audiences for the information coming from your project, and you need to know what they want to know.

Now you cannot decide, in a corner over here, what your audiences want to know, or what the school district wants to know, and then generate a series of papers, because I come from a school district where papers end up on a shelf and are never opened. You have to find out what is important to that high school in San Antonio, what they want to know about their students, as well as what NSF wants to know. You might need to determine what your collaborators want to know about what is happening. If you are directing your students or

asking them to be put into special programs that your collaborators might be doing, you need to find out what they want to know in relation to the risk of taking the students who you are recommending. You will get far more questions than you ever wanted in life, and so you will have to decide on your priorities. If your major audience is NSF, the questions that NSF asks are the ones that are your major priority, because NSF will expect answers. You will also have to determine the important questions on which you will need to focus. Then you need to decide what information is needed to answer those questions, and from whom, and so on.

This spring, I had an opportunity to meet with Dr. Brown, and we developed a series of prototypical questions that follow the objectives of CRCM. You have a packet with a lot of questions. We are not saying that all of these questions need to be answered, and we are not saying that we have brought up all of the questions that need to be answered. We looked at the program announcement and tried to make it a user-friendly objective.

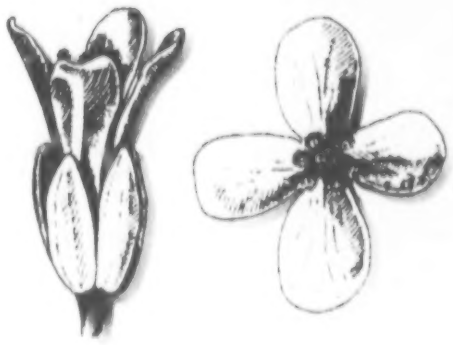
Develop and strengthen the capacity to deliver quality instruction in school science and mathematics education for minority students that will increase the number of minority high school graduates who are academically prepared to attend college and major in the sciences, mathematics, or engineering: that is an objective. Next, we determined what kind of questions to ask in relation to that objective. Here is an example: "What was the impact of teacher enhancement activities, in-service training, or staff development, and new materials on the students?" We cannot collect data for one year and say, "Here we are, one year." We have to collect data sometimes in a comparative mode. So we are collecting 1991–1992 versus 1992–1993. What happened? We might want to know students' grades for precalculus, calculus, chemistry, and physics.

Another question, and another criteria for success, is the number of high school graduates who were eligible to become SEM majors in college. We are talking now about the pipeline, so we might want to know the number and percentage of level one students who completed precalculus, calculus, chemistry, and physics in 1992–1993 with a grade of C or better. We are not just talking about one grade; we are talking about a whole series of grades. So we are talking about pipeline types of information, and we are comparing 1991–1992 data and 1992–1993 data according to race, ethnicity, and gender. Sometimes, if you bunch everybody together, there is a subgroup that has really not been given any attention.

So when we are in a city where the majority is now a minority, there are some other minorities who may be in the same fix when the majority was actually the majority and the minority was truly the minority. So the scenario shifts to who is the majority and who is the minority among underserved minorities. Am I making myself clear?

I was listening, and I was very concerned, and I am not picking on any institution. We talk about parity, about African-American students at parity with the population, but is that enough? And if one percent can turn out to be two students, and I think that is what Dr. Calbert was concerned about, when you use percentages only, you sometimes mask the number of students who are actually being served. It may be parity, but if we are really into the outreach business, then we want more than parity in relation to small numbers of students. When you have very small numbers, maybe you want to get all of them, not just the 1 percent that is parity across the district. I draw that to your attention because sometimes we get comfortable with statistics when they should make us uncomfortable.

We can look at the number of level two students by race, ethnicity, and gender, with the same kinds of data coming forward. If you look at your packet, there are a lot of questions there. Does this do anything for you? One of the persons coming out of Philadelphia said, "I saw some questions I never thought of before. And there is one in particular that I want to be sure that I use in the next evaluation."



We are not saying that these are the questions to use as the Bible, but we hope that some of these questions will prove to be catalysts for you to generate some more questions when you are developing your evaluation reports. You do need to do an annual evaluation report. Some of these questions will begin to appear on your annual reports. Only Dr. Brown and Dr. Jones will be able to tell you what they are.

Now there is a part B to the evaluation. Our office really is interested in being helpful, and we hope that these questions, the generation of these questions, will be beneficial.

There is another part that we really want to do. We feel that evaluators really need to be part of the research community, and every year there are two groups—the association evaluations and the American Educational Research Association (AERA)—that generally meet in the springtime. They are meeting in New Orleans, Louisiana, this spring, right after Easter Sunday. What we are proposing is to bring in all of the project evaluators for CRCM for a one-and-a-half day project evaluation workshop. I

believe this is something that those of you who are evaluators might find helpful.

> *"We are trying to be helpful and work with you so that you have the best information that you can use to modify your projects and make them better."*
>
> FLORALINE STEVENS
> *Program Director,*
> *Research, Evaluation, and Dissemination*
> *National Science Foundation*

Now, what we have done in NSF, really coming from my office, is to produce what we call a user-friendly handbook for project evaluation. It is now completed and is going through clearances, going to OMB, and then back for final clearance. We have ordered 5000 copies of the handbook to be produced, and we will send enough copies to your project. So you will not have to order one. The project PIs, if there are one or two, will each have a handbook. The analyst will have one, and the evaluator will have one. We are not going to be stingy. You know how we can send one copy, and then everybody has to go scramble or photocopy it. We hope to use that handbook as the basis for the workshop in New Orleans.

We are trying to be helpful and work with you so that you have the best information that you can use to modify your projects and make them better. We also want you to have the best information for HRD and NSF so that they can make wise decisions.

I think you heard Dr. Williams say that, when he is called before Congress, Congress is not interested in the process kinds of things, such as the information that we collect or the project evaluations in which you are trying to fine-tune your project and make it better. They are not interested in that. They are interested in the bottom line. How many students did you get through these courses? Did they move on to the next course?

I want to end with an observation that I thought was very important, and I have not heard it mentioned in relation to the projects that reported this weekend. The Morgan State University PI talked about how hard they worked with the algebra teachers to prepare them to be more receptive and better prepared to teach the students in algebra. Here is the point that I believed was critical: she said, "When you get all these students successfully through algebra, what have you done to build the success rate when they move to geometry? Who have you prepared? You got them going, you got your first and second cohort of students, and they have done it, they have passed, they got a C or better. If they hit the same block wall that they would have hit when they were taking algebra, then all you have done, if you built them up, is to slap them back down again."

In your planning and in your projects, I think that is an important evaluation question. What is this project doing to move students along the pipeline once they successfully complete the algebra section of their endeavors?

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NSF Western Regional Conference
October 8–10, 1993

Host:
University of Texas at El Paso

The National Science Foundation

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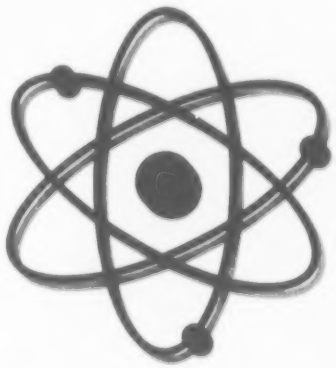

SOUTHERN CALIFORNIA CAREER ACCESS CENTER

(established 1989)

INSTITUTION
CALIFORNIA STATE UNIVERSITY
LOS ANGELES, CALIFORNIA

PRINCIPAL INVESTIGATOR
JEWEL P. COBB

EXECUTIVE DIRECTOR
JUDITH DAY

PROJECT SUMMARY

The ACCESS Center carries out an important approach to the national rationale for the regional centers. Programs within ACCESS are strategically focused on the pipeline concept. We are now focusing on the transition of our ACCESS middle schools to high schools. Our high school college preparatory program targets minority students with GPAs between 2.0 and 2.9, thus providing college access to over 500 students who traditionally would not have attended college. ACCESS funds a coordinator, tutoring, extra classes, and motivational activities, thereby providing a structure that can be institutionalized by the school.

At the middle school level (grades six through eight), intensive teacher enhancement projects focus on innovative curriculum ensuring quality prealgebra and science for all middle school students. Our teacher summer science academy, a joint venture with Cal Tech, provides hands-on life science curriculum for middle school teachers. The Algebra Project offers quality prealgebra pedagogy and curriculum in using a multicultural format.

ACCESS also supports Mathematics Engineering Science Achievement (MESA), Junior MESA programs, a Mobil Science Museum, a Math Enrichment component of The Young Black Scholars, and two summer mathematics and science intensive programs for middle and high school minority women.

The ACCESS Center is continually developing collaborations with other reform programs in the Los Angeles basin to leverage and enhance our outreach efforts. The Southwest Regional Laboratory (SWRL) and the U.S. Space Foundation provide opportunities to deepen and expand our impact with minority children. Furthermore, ACCESS actively seeks funding from local sources such as those provided by our Corporate Advisory Board. Many of our currently funded programs are jointly supported by university contributions, corporate participation, school district resources, and organizational and individual commitments. The ACCESS Center is also submitting additional proposals for funds that will support the expansion of its teacher enhancement programs.

PROJECT TESTIMONIALS

"Since ACCESS started retraining all the math teachers, the department has improved not only as a whole but individually as well. The teachers now share a renewed spirit and zest as they exchange ideas, lessons, and materials among themselves. They no longer work in isolation but rather as a cohesive group of professionals who do their best for students. We have indeed been the fortunate benefactors of the alliance ACCESS has developed between California State University, Northridge, and this school."

Ms. Maria Reza, Principal
ACCESS to Algebra,
San Fernando Middle School

Table 1.

MOS Baseline Data

The MOS database was developed by the Southwest Regional Laboratory (SWRL) under contract for ACCESS and completed during the summer of 1992. ACCESS' Evaluation Analyst, hired in the fall of 1992, began gathering as much baseline data as possible on ACCESS participants. Below is a chart indicating the number of participants in each program in 1990–1991, indicating grade level and contact hours.

Instructional Programs	*Discipline Focus*	*Target Audience*	*Setting*	*Contact -Hours*	*# of Participants*	*# of Participants by Grade*
ACCESS to Algebra	Mathematics	Middle/Junior High School	Academic Year	320	2615	7th=903; 8th=865; 9th=847
Junior MESA	Math/Science Engineering	Middle/Junior High School	Academic Year	109	380	7th=148; 8th=130; 9th=102
Science Consortium	Science	Middle/Junior High School	Academic Year	12	50	6th=10; 7th=15; 8th=13; 9th=12
Lincoln High School*	College Prep. Math/Science	High School	Academic Year	1120	112	9th=60; 10th=52
Marshall High School	Math/ Science	High School	Summer (11 weeks)	220	30	9th=8; 10th=8; 11th=7; 12th=7
Roosevelt High School	College Prep.	High School	Academic Year	200	77	9th=40; 10th=37
Summer Intensive Mathematics	Mathematics	High School	Summer (4 weeks)	96	75	12th=75
Academic Excellence Workshop	Mathematics	Undergraduate	Academic Year	240	342	
Minority Science Program	Math/ Science	Undergraduate	Academic Year	280	212	
MSE Tutorial Program	Math/ Science Engineering	Undergraduate	Academic Year	42	66	
Total				2639	3959	

"We are entering our third year of this ACCESS program, through Cal State University, Northridge, and I can unequivocally attest to the invaluable benefits of this program. This feeling is firmly supported by the teachers and students at McClay. We expect to see proof of the efficacy of the program when last spring's test scores of the California Learning Assessment System exam are returned. We have seen the almost complete transformation of the instructional practices of our mathematics department. Teachers and students are now working with interactive, hands-on material. Collaborative grouping is the norm, and we are working on developing alternative forms of assessment. We certainly invite further discussion of this truly wonderful mathematics project."

Cecilia Costas, Principal
ACCESS to Algebra, McClay Middle School

"I participated in the University Preparatory Program (UPP) since it first began at Lincoln High School. Now I am a freshman at Cal State, L.A., working for the ACCESS Center, pursuing the educational goals I set for myself when I agreed to be a part of the program. I can honestly say that it has been to my advantage to be a UPP participant. We were given special attention and advice that minority kids need. We focused on sciences and math...and participated in lab activities at Cal State, L.A., and so, were able to grasp the feeling of the college environment. We all worked hard to get where we are, but the program gave us extra assurance that we were not alone and gave us a push to strive for our best."

Sally Esquivel, CSULA freshman
University Prep Program, Lincoln High School

"Prior to ACCESS, most of the activities we were involved in were funded by educational grants that delineated specific operations and focused primarily on grades 9–12. ACCESS gave us the flexibility of working with children in grades six through nine which has proven to

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be advantageous for our Center. The results of the early outreach efforts have placed more students in PreAlgebra and Algebra I. ACCESS has also been instrumental in providing teachers with opportunities and training that many public schools can no longer afford. Our staff and constituents are very appreciative for the support received from ACCESS."

Dr. Zelma Allen, Program Director
Mathematics, Engineering,
Science Achievement,
Loyola Marymount University

GENERAL PROJECT DATA

Number of Level I Students. . . 599

Number of Level II Students . 7705

Number of Elementary Schools . . 0

Number of Middle Schools 26

Number of High Schools 5

Number of School Districts 4

Number of Community-Based Organizations Involved 19

Number of Industries Involved . 12

Total Number of Precollege Students 8304

Total Number of Program Activities during the Year. 30

Number of Ongoing Activities. . . 5

Number of One-Day Activities . . 2

Number of Periodic Activities . . . 6

EXEMPLARY PROJECT STRATEGIC PLAN AND OUTCOMES

Access Qualitative Evaluation

The ACCESS Center at CSLA is entering the fifth year of its programs to provide innovative science and mathematics enrichment experiences and enhance the content knowledge and pedagogical skills.

The primary objective of this study is to conduct an overall qualitative review of effectiveness of the ACCESS program in terms of initiating lasting change in teacher performance.

The evaluation objectives are to

- Assess the effectiveness of teacher training workshops to provide teachers with the scaffolding they need to successfully implement the new curriculum in their classrooms.
- Document the attitudes of teachers through one-on-one interviews, investigating teachers' views on new teaching methods and attitudes toward students. Interviews may be audio taped and transcribed so that responses may be analyzed at a later time.
- Assess the effectiveness of each type of program—student-centered programs in high schools and teacher-centered programs in middle schools.
- Measure students' attitudes toward learning mathematics. The four factors to be used are confidence in learning mathematics, attitude toward success in mathematics, mathematics as a male domain, and the usefulness of mathematics.
- Compare the differences in attitudes of teachers and students between ACCESS participating groups and nonparticipating groups.
- Measure impact of teacher intervention.

SYSTEMIC-RELATED ACTIVITIES

ACCESS has two programs that have led directly to systemic change at local school sites. The California State University, Northridge (CSUN) program has spearheaded systemic change within the mathematics departments at three middle schools. For the part three years, CSUN has provided training in a variety of innovative mathematics curricula to all of the teachers, simultaneously, within a given school's mathematics department. These trainings are held several times during the school year. As a result of this effort, the mathematics departments involved have reorganized themselves to offer reform curriculum that includes new ways of assessing student progress, cooperative learning groups, and proactive hands-on curriculum. School administrators are supportive of the changes, and all students are in math classes that lead to algebra, geometry, and higher mathematics. Teachers meet regularly and are involved in the decisions of how students are programmed into math classes. Remedial classes have been abandoned in favor of more enriched curriculum. At San Fernando High School, which has completed its third year of the program, there are three more algebra classes and two more geometry classes being offered. Pacoima Middle School has completed its second year with the program and has added one more algebra class. The CSUN program involves 47 teachers, affecting 8500 students.

Discussion and articulation have occurred with the receiving high school and ACCESS is supporting a High Technology College Prep Program which began in Year 5. Students like the new curriculum, and according to one teacher she constantly hears, "I didn't know math was fun!"

The second program that has led to systemic change is our Lincoln High School University Prep Program (UPP). This is the model site of our overall college prep program and has been part of ACCESS for the entire four years. This program targets B/C minority students and provides a multifaceted program that includes rigorous academic course work with tutoring support, parental involvement, and special activities. UPP currently involves 264 students, 12 teachers, and 1 counselor. UPP students make up 12 percent of the student body.

ALLIANCE OF STATES SUPPORTING INDIANS IN SCIENCE AND TECHNOLOGY (ASSIST)

(established 1991)

INSTITUTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA

PRINCIPAL INVESTIGATOR
DAVID M. YOUNG

CO-PRINCIPAL INVESTIGATORS
JOHN R. AMED
ARTHUR L. MCDONALD

PROJECT DIRECTOR
KENNETH PEPION

PROJECT SUMMARY

The Alliance of States Supporting Indians in Science and Technology (ASSIST) is a Comprehensive Regional Center for Minorities (CRCM) administered through Montana State University with projects operating in eight northern tier states, including Oregon, Idaho, Washington, Montana, Wyoming, North Dakota, South Dakota, and Minnesota. The ASSIST region is home to more than 300,000 American Indians and 19 of the Nation's 27 tribal colleges who form the target population for ASSIST-sponsored projects. Beginning in 1991–92, the ASSIST Program received funding from the National Science Foundation for a five-year period terminating in 1995–96. The overall goal of ASSIST is to provide a comprehensive approach to address the serious underrepresentation of American Indians in science, technology, engineering, and mathematics (STEM) at the K–12-grade levels. This is accomplished by establishing collaborative projects with tribal leaders, teachers, parents, state and Federal agencies, tribal colleges, four-year colleges, and universities, businesses, and industry. A major objective of ASSIST is to promote systemic change in the delivery of STEM curriculum to American Indian students. The following results from the 1992–93 program year indicate a high level of involvement in ASSIST projects:

- A total of 1164 American Indian students were direct participants (Level I) in ASSIST sponsored projects, and 12,986 benefitted indirectly from ASSIST projects (Level II).
- ASSIST projects were implemented in 124 K–12 schools in the eight-state region.
- Collaborative partnerships were developed involving 44 community-based organizations and 85 industries in the delivery of STEM activities to American Indian students.
- A total of 227 teachers participated in ASSIST projects.

ASSIST projects have successfully developed unique curriculum materials that integrate culturally relevant themes in the teaching and learning of STEM, and materials developed in ASSIST projects have been incorporated into the curriculum of participating schools. A major strategy underlying

ASSIST activities is a hands-on approach to STEM on the part of students, parents, and tribal leaders.

PROJECT TESTIMONIALS

"The grant from the ASSIST program helped Turtle Mountain Community College design a mathematically intensive summer enrichment project for the middle and high school students on the Turtle Mountain Indian Reservation. The overall goal of the project was to nurture, motivate, attract, and retain middle and high school students into science, engineering, and mathematics by providing them with continual intervention activities through summer and Sunday academy programs. We believe that we have partially achieved this goal the past two years by retaining 75 percent of the students in the ASSIST pipeline."

Sunil Kamawat, Project Director
ASSIST Project, Turtle Mountain Community College

"The water quality analysis that was performed at Ronan High School was very helpful in understanding science and scientists' jobs. The experiments involved collecting and analyzing data at several sites along Spring Creek and Crow Creek. These experiments helped me understand what experimenting meant. After the data was collected, we realized that not all science equipment was flawless. We also realized that in certain areas habitat could not possibly grow or begin to grow because of the conditions of the water. The experiments were beneficial because they were hands-on. If the data would have been previously collected, the data or numbers would not have the same significance. These experiments help me understand science, realize that there are faults in science equipment, and help me to have a better comprehension of what it means to work with your own hands. I enjoyed the experiments because we learned from observations, not textbook material."

Niki Webster, Student
Ronan High School

"The presence of the ASSIST program in our region has greatly enhanced the networking between the tribal colleges and our four-year institution. Prior to ASSIST, there were few forums to collectively address our students' needs. Now, with ASSIST in place, there is a hub and a communication link between more partners in education."

Sara J. McCulloh,
Director of Scientific Knowledge for Indian Learning & Leadership
South Dakota School of Mines & Technology

"Because of the ASSIST Math Mentorship program, we made contact with students who may otherwise have failed math. They passed their classes with a better understanding of math, and because math is such a problem subject for American Indian students, we have helped keep them from failing. I think that those who passed have higher self-esteem and a sense of accomplishment which helped them stay in school."

Stacy Phelps, American Indian Mechanical Engineering ASSIST Math Mentorship Program, South Dakota School of Mines & Technology

Table 1.

Systemic Change — Impact of ASSIST Funding in the Classroom Not Covered in the Water Quality Student Heroes Project

School Year/Course	Enrollment	AI Enrolled	AI %
1991/92 School Year			
Physics	15	3	20%
General Chemistry	42	12	28%
Earth Science	20	8	40%
1992/93 School Year			
Physics	14	4	28%
General Chemistry	40	10	25%
Earth Science	20	6	30%
1993/94 School Year			
Physics	10	4	40%
General Chemistry	28	9	32%
Earth Science	28	11	39%
Total 1991–1994	217	67	31%

GENERAL PROGRAM DATA

Number of Level I Students	1394
Number of Level II Students	9848
Number of Elementary Schools	44
Number of Middle Schools	43
Number of High Schools	34
Number of School Districts	97
Number of Community-Based Organizations Involved	59
Number of Industries Involved	54
Total Number of Precollege Students	1260
Total Number of Program Activities during the Year	98
Number of Ongoing Activities	19
Number of One-Day Activities	48
Number of Periodic Activities	31

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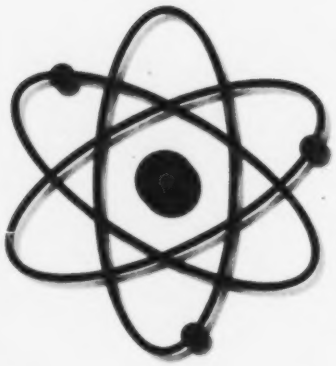
EXEMPLARY PROJECT STRATEGIC PLAN AND OUTCOMES

Water Quality Heroes
District Number 30
Ronan, Montana

The overall goal of the Water Quality Heroes project is to increase the American Indian enrollment in upper-level science classes at Ronan High School so that it mirrors the percentage of American Indians in the high school. The recruitment, retention, and graduation of American Indians in the sciences are accomplished through student involvement in water quality measurement of streams located on the Flathead Indian Reservation, using quantitative and qualitative field and laboratory tests.

In the first year of the ASSIST program, a $1000 "minigrant" was awarded to Ronan High School project director Mark Decker to establish field test kits for water quality testing, complete with lesson plans for classroom use in grades K–12. Lesson plans using the field equipment were developed through teacher training sessions and field tested by two high school teachers, four middle school teachers, and 160 students in grades 7–12 in the first project year. In order to accomplish the goal of increasing the numbers of American Indian students in upper-level sciences in the high school, ASSIST developed a comprehensive and longitudinal approach that is being implemented in three phases:



PHASE I

An orientation day for key project personnel was conducted in a field setting to acquaint them with the use of equipment and a timetable of project activities. A student field day was then conducted with small groups of students paired with trained teachers and invited water quality personnel. Students were instructed in the methods of equipment operation, given the parameters of stream data collection, and trained in field safety. High school students in advanced chemistry and natural science classes were introduced to stream monitoring and water quality analysis procedures used by many water quality agencies. Using the water quality kits developed in the prototype year, students gathered field data and performed laboratory analysis in cooperation with county and tribal agencies in the area and provided presentations to local agencies regarding the results of their activities.

PHASE II

High school students from Phase I served as role models for younger high school students, providing leadership, direction, and instruction in water quality data gathering and analysis. Additionally, freshmen and sophomore students were exposed to computer analysis methods using a computer Geographical Information System program to simulate water management problems. Emphasis was placed on computer spreadsheet analysis, mapping skills, and conducting experiments using water quality equipment. Younger students receive ongoing encouragement and support into the next phase of the project.

PHASE III

American Indian students participating in Phases I and II recruit younger students from middle and elementary schools and become peer tutors for them on field trips. Younger students are taught the basics of water quality and establish base study stations along a local creek. Field activities are then followed by laboratory analysis with emphasis on the use of computer interface equipment. A "water quality week" is planned involving all levels of students, with older students playing a primary leadership role. Future plans include project students demonstrating water quality management activities to students from other tribes along the Columbia River Basin and maintaining contact by way of computer networks to share information concerning water management.

PROJECT EVALUATION

Given the goal of increasing the number of American Indians in upper-level science classes, year one (1991–1992) serves as the baseline from which to quantitatively compare the number enrolled in future years. As a qualitative measure, students, teachers, tribal, and county agencies complete an evaluation form assessing the activities in which they were involved and the degree to which the objectives of the program were met. A third evaluation tool is a Water Quality Environmental Analysis project completed by the advanced chemistry and natural science classes that is utilized by local water quality agencies. A final evaluation activity is a slide show of activities completed by funding from student Water Quality Heroes Project.

ASSIST ACTIVITIES AND SYSTEMIC CHANGE

Systemic Change: Statewide

ASSIST has collaborated with the State Systemic Initiative project,

the State Initiative for Montana Mathematics and Science (SIMMS) Project, and the state of Montana to implement fundamental change in the mathematics curriculum in grades K–12. The SIMMS Project has developed and implemented a new mathematics curriculum in the state of Montana that is taught with a problem-solving, problem-centered approach rich in real world applications and utilizing appropriate technology.

The ASSIST Office participated in planning with the Systemic Teacher Excellence Preparation (STEP) Program in the state of Montana to redesign college-level mathematics and science courses emphasizing integrated and innovative curricula for both elementary and secondary precollege teachers.

In South Dakota, eight ASSIST projects targeting Native Americans were developed in conjunction with the South Dakota Statewide Systemic Initiative (SSI). Under the auspices of the South Dakota SSI, an American Indian committee has been formed to gather ideas, data, and research; discuss policy positions; and develop plans to improve teaching of mathematics and science to American Indians in grades K–16.

In the states of Oregon, Idaho, and Wyoming, ASSIST projects gathered statewide data on numbers of American Indian students in schools, graduation rates, attrition rates, and other demographic data which will establish a baseline for future projects aimed at statewide systemic change in STEM. Data gathered also include a list of all programs and projects that promote STEM among American Indians.

Systemic Change: Local Level

Efforts to achieve systemic reform on the Cheyenne River Reservation in South Dakota involve a working partnership with school districts, Cheyenne River Community College, and the Cheyenne River Sioux Tribal Council. The project is working to connect mathematics and science instruction in grades K–6 to instruction in grades 7–12, while developing innovative curricula to integrate Native American culture in mathematics and science curriculum at all levels.

At the Takini School in Howes, South Dakota, the Takini Math/Science Systemic Change Project has been designed to create systemic attitudinal change in college faculty, K–12 teachers, parents, students, administrators, and other community members regarding math, science, and technology.

The Water Quality Heroes Project in School District #30, Ronan, Montana, is an example of a comprehensive and longitudinal approach to increasing the numbers of American Indian students enrolling in upper-level science and mathematics classes at Ronan High School. High school students in advanced chemistry and natural science classes are trained in water quality monitoring in local streams on the reservation and in turn serve as peer mentors to younger high school and middle school students.

> *"The presence of the ASSIST program in our region has greatly enhanced the networking between the tribal colleges and our four-year institution. Prior to ASSIST, there were few forums to collectively address our students' needs. Now, with ASSIST in place, there is a hub and a communication link between more partners in education."*
>
> SARA J. MCCULLOH,
> *Director of Scientific Knowledge for Indian Learning & Leadership*
> *South Dakota School of Mines & Technology*

THE NEW MEXICO COMPREHENSIVE REGIONAL CENTER FOR MINORITIES

(established 1991)

INSTITUTION
NEW MEXICO HIGHLANDS UNIVERSITY
LAS VEGAS, NEW MEXICO

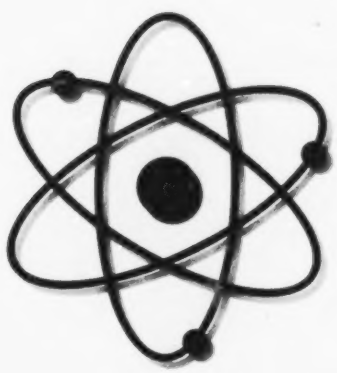
PRINCIPAL INVESTIGATOR
VICENTE J. LLAMAS

CO-PRINCIPAL INVESTIGATOR
BETSY YOST

PROJECT SUMMARY

Our mission is to implement a comprehensive SEM continuum, K–12, that will triple the number of college-ready minority high school graduates in five years.

The New Mexico CRCM targets rural districts with minority enrollments of at least 51 percent. It has identified three projects that offer students K–12 SEM-enhanced experiences beyond regular school offerings. These are the Community Academy for Continuum Science and Mathematics (CASM), the NM Mathematics Engineering Science Achievement (MESA), and the Summer Science Leadership Camp (SSLC).



CASM (4–6) brings parents, students, community members, and teachers together on a regular basis to experience hands-on science and math activities. A Community Advisory Group is formed to help identify local resources to supplement and finally institutionalize. This program and related special projects are in 16 schools and have a direct impact on over 671 students.

In NM MESA (6–12), students have significant involvement in SEM experiences, including leadership, summer academic enrichment, and mathematics and science competitions. MESA advisors receive training in science and mathematics, leadership, and school systemic reform. It also includes strong parental leadership development and teacher enhancement in cooperation with the State's Systemic Initiative. NM-CRCM has directly supported 14 schools affecting 420 students. Through the monthly teacher advisor training program, NM-CRCM has also had an impact on 50 schools with over 2800 students.

The 1993 Summer Science Leadership Camp graduated over 140 middle school students. Camp objectives included intensive hands-on experience in math and science, career and academic planning, cooperative learning, prealgebra, and problem solving. Statewide collaboration has been initiated to establish SSLCs in at least five regions throughout New Mexico. The College Bound Math/Science program at the Southwest Indian Polytechnic Institute (SIPI) offered 80 camp participants (grades 9–12) experience in laboratory work, field research, and applications of math, science, and computers to various real world projects. The Summer Academic Enrichment Camp (grades 7–9) through NM MESA offered science and prealgebra training for 62 students.

In addition to these three central projects, the continuum of enhanced experiences includes a number of projects developed and sponsored through collaborations with partners. These include the Advanced Placement Program, special initiatives with BIA Day Schools, a school- and community-based wetlands project, and teacher enhancement activities that have provided SEM and school reform training for over 200 teachers.

PROJECT TESTIMONIALS

"CASM has changed the way I look at science and math, especially science. I always looked at science as being boring and hard,

but being in CASM, science is fun and interesting.

The projects we have worked on have been from making masks and dissecting a fetal pig and a cow eye. We also made a spaceship. None of the classes have been boring. All have kept us busy and interested.

It has made our family closer. We go to places together. My family likes it and so do I."

Rena Herrera, CASM Student
Pecos Elementary, grade 6

"Just being there with students and being able to learn more along with them—It was more meaningful to them also."

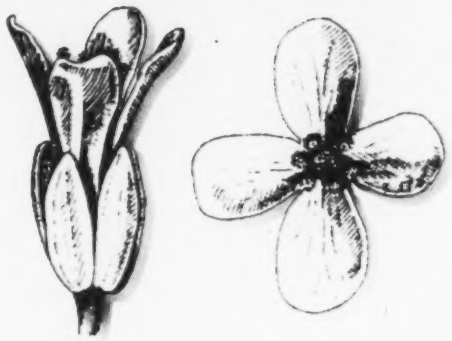
CASM Parent from
Isleta Pueblo, NM

"It is hard to express the twinkle in a student's eye after winning or placing in a MESA contest or a parent standing proudly as his/her son/daughter receives an award. A student's reaction when receiving his/her first paycheck for using his/her talents tutoring students in math or science or to listening to a student speaking of his/her experiences after returning from a NASA trip. This is happening because of MESA. I am proud my school is part of MESA and proud that my daughter and son are part of MESA."

Ray Collins, Principal
West Las Vegas Middle School

"The NM-CRCM has been, and continues to be, a crucial and valuable asset in New Mexico's systemic reform efforts. Through its involvement with the Governor-created Council for the Advancement of Mathematics and Science Education (CAMSE) and the Systemic Change in Education Advisory Committee, we are confident that NM-CRCM will significantly increase the number of science, engineering, and mathematics college-ready minority high school graduates in our state."

Chuck Spath
Office of the Governor



GENERAL PROGRAM DATA

Number of Level I Students	1675
Number of Level II Students	11,501
Number of Elementary Schools	32*
Number of Middle Schools	47*
Number of High Schools	73*
Number of School Districts	36**
Number of Community-Based Organizations Involved	23
Number of Industries Involved	7
Total Number of Precollege Students	13,176
Total Number of Program Activities during the Year	490
Number of Ongoing Activities	446
Number of One-Day Activities	17
Number of Periodic Activities	27

*22 schools were counted in more than one category: 5 are K–12, 6 are K–8, and 11 serve students in grades 6–12.

**19 of these districts have one or more CRCM student pipeline programs.

EXEMPLARY PROJECT STRATEGIC PLAN AND OUTCOMES

Community Academy for Science and Mathematics (CASM)

The Community Academy for Science and Mathematics (CASM) is a program that targets fourth-, fifth-, and sixth-grade students who have the interest and motivation to increase their abilities in science and mathematics. A significant number of students in this grade category begin to lose interest in their academic courses, primarily mathematics, science, and communication skills, before they enter the seventh grade. To intervene before motivation levels drop and students become distracted, CASM attempts to identify these students and offer special sessions to personally establish goals and reinforce strong, successful self-images.

CASM is designed to provide activities and experiences that would encourage and enable selected students to prepare for productive professional careers. These activities attempt to refine skills in mathematics, science, and communication. Activities are designed to expand and extend the classroom instruction by involving the students, their parents, and other community members in challenging, interesting related activities. Additionally, leadership and an awareness of

community involvement are important objectives.

To deliver these activities, CASM has developed a well-structured program that emphasizes critical thinking approaches and language skills that reflect the need to communicate in the real world. Community resource people, including professionals and scientists (if possible) act as mentors or presenters and meet with students, parents, and participating teachers during special evening sessions. (N.B., In some CASM programs, great distances between home and school preclude after-school projects. In this case, in-school projects with occasional parental involvement are acceptable.) The participants are usually broken into small groups (four to five per group) and work on activities that the mentors/presenters have developed. The activities utilize the concepts and skills that the students are learning in their regular classrooms but are extended to real world situations. For example, students studying about heat and light may build miniature adobe homes to monitor heat storage and temperature variations. This represents a very different approach in that it is teaching the students not only how to answer questions but also how to organize and ask questions as well.

An active, involved parent/community organization, CAG (Community Advisory Group), is formed to support and participate in the program. The CAG's responsibility is to support CASM in their community and to develop plans to institutionalize the program over a two-year period. One important component of the student application process requires a parent or family member to commit to supporting and actively participating in the program.

CASM:

- Designed to develop a community/school-based program in science and mathematics enhancement activities.
- Designed by science and mathematic teachers in schools, community volunteers, parents, and initially, NM-CRCM staff.
- Community Advisory Group identifies local resources (people, materials, funding) to supplement and finally support the program after NM-CRCM funding ends.

CRCM STUDENT IMPACT

- More than 1398 students (Level I) have been directly involved in one or more NM-CRCM-sponsored activities.
- A total of 174,220 student contact hours have been provided to NM-CRCM students since September 1992, with an average of 125 hours per student.
- Over 200 (12%) of the students participated in more than one NM-CRCM-sponsored activity.
- A total of 24,197 Level II precollege minority students were indirectly affected by NM-CRCM activities.

SYSTEMIC-RELATED ACTIVITIES

- 18 Community Advisory Groups are instituted at CASM sites.
- All 18 CASMs have incorporated hands-on teaching techniques into the school's daily curriculum.
- Advanced Placement is now instituted at NMHU. The focus is to upgrade middle and high school science and mathematics curricula to AP standards.
- Formal MOA was signed with the State's Systemic Initiative (SIMSE).
- Full inclusion of students with disabilities is being incorporated into CRCM programs. Teacher and counselor training with the support of AAAS and CRCM's Astral Animators Camp will speed implementation.
- Exploration Station was instituted in northern New Mexico.
- NMCCSET was formed with Directors of Science and Mathematics Initiatives.
- CRCM PI is an advisor to the Governor's Council for the Advancement of Mathematics and Science Education & Systemic Change in Education Advisory Committee.
- Formal MOU with NM-AMP resulted in $25,000 for a Summer Bridge Program.
- Summer Science Leadership camps led to a statewide consortium.

MARICOPA COUNTY COMPREHENSIVE REGIONAL CENTER FOR MINORITIES

(established 1990)

INSTITUTION
MARICOPA COUNTY COMMUNITY COLLEGE
PHOENIX, ARIZONA

CO-PRINCIPAL INVESTIGATORS
ALFREDO G. DE LOS SANTOS
KATHLEEN CHURCH

PROJECT DIRECTOR
ERNESTO RAMIREZ, JR.

PROJECT SUMMARY

The Maricopa County Comprehensive Regional Center for Minorities (CRCM), operated by the Maricopa County Community College District, is a provider of collaborative efforts and activities designed to restructure both curriculum and pedagogy in mathematics and science from kindergarten through high school. The goal of the CRCM, over a five-year period, is to double the number of Latino, African-American, and American Indian graduates from Phoenix CRCM schools who are proficient to pursue studies in science, engineering, and mathematics. Since 1991, approximately 4600 students, 630 teachers, and 950 parents have participated in CRCM programs designed to improve student retention in science and mathematics courses so that target group students are prepared to enter college programs in science, engineering, and mathematics (SEM) after high school graduation. Through teacher training, the CRCM's programs have had an impact on science and mathematics pedagogy that affects approximately 42,000 students in grades K–12.

Funding for the Center is provided by the National Science Foundation and a variety of other sources including business and industry; participating Maricopa County schools and community colleges; Arizona State University; community organizations; state governmental agencies; and private foundations.

The CRCM, in order to insure longitudinal continuity in service delivery to participating students, established 12 "clusters" whose schools have high concentrations of minority students. Each cluster includes those schools from elementary through community college which "feed" students to one another and, as a result, are jointly responsible for student success at all levels. Because many districts in the county do not include high schools, this innovative approach has created an informal "unification" among schools and districts for program planning and service delivery. The result is an articulated, stepwise continuum of programs and services from K–12, each designed to prepare target group students for success at the next level. A total of 27 elementary, 20 middle/junior high schools, and 16 high schools, representing 16 school districts; and 6 community colleges participate in the 12 CRCM clusters.

Programmatically, the CRCM's approach is

- To provide academic and

Table 1.

Outcomes[1]

Outcomes	School Year		
	90/91[2]	91/92	92/93
8th-Grade Students Who Completed Algebra I	124	148 (19%)	248 (99%)
9th-Grade Students Who Completed Algebra I	740	827 (12%)	887 (29%)
Completion of MOS AP Math and Science	71	85 (20%)	92 (29%)
High School Graduates	1414	1513 (07%)	1612 (14%)
Proficient[3] High School Graduates	189	255 (35%)	297 (57%)

[1]The following criteria apply to data:
- African-American, American Indian, and Latino students
- CRCM Cluster Schools

[2]Baseline school year
[3]Proficiency defined as follows:
- Three college preparatory math classes and
- Two laboratory college preparatory science classes

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attitudinal enhancement activities directly to students in the regular school year, both during regular academic day and extended day programs, and in the summer.

- To provide curriculum, materials, and teacher training to improve the math and science instruction participating students receive in their regular classrooms.
- To provide parental activities to enhance the abilities of the participants' parents to assist at home in concept formation and to build support for their children to enter SEM careers.

The CRCM has also taken an active role in efforts to restructure curriculum and pedagogy in mathematics and science in participating schools. The beginning of systemic change in mathematics and science curriculum and pedagogy is evident in several participating schools. For example, one district has rewritten its eighth-grade curriculum to include prealgebra so ninth-grade students will enroll in algebra, not prealgebra as they previously did; another is shifting prealgebra from eighth grade to seventh grade so that eighth grade students take algebra. One high school has rewritten its ninth-grade algebra curriculum to incorporate hands-on methodology, and another will implement the Interactive Math Project (IMP), a "real world," three-year integrated algebra and geometry class in the 1992–93 school year. Concurrently, CRCM science teachers are shifting from a textbook- driven curriculum to a theme-based approach which actively involves the students in experiencing science by utilizing hands-on materials.

"Be assured, the source of my growing enthusiasm for mathematics as a field of study can be directly traced to the CRCM. My students are enthused, and I'm thrilled with the progress they are making."

DAVID FOGELSON
High School Science and Math Teacher

PROJECT TESTIMONIALS

"Because of the CRCM I have decided to pick a field in science. I know that the camp has had a good impact on the other students and that the CRCM is doing a great job at encouraging them to attend school and possibly pick a career in math and science."

Esparanza Pina
Student

"Be assured, the source of my growing enthusiasm for mathematics as a field of study can be directly traced to the CRCM. My students are enthused, and I'm thrilled with the progress they are making."

David Fogelson
High School Science and Math Teacher

"CRCM has become part of Murphy School District, and as we have been able to add various CRCM components to our institution's budgets, we have done so. We will continue to expand different activities to all our schools, and we will continue to train staff under CRCM modules. Our participation with CRCM has helped our district tremendously."

Arturo Carrizoza
Assistant Superintendent for Administrative Services

"I believe that when these students reach college age they will be better prepared to meet the challenge that faces them. Their ability to succeed is based upon the foundation this program helps to build. I look forward to being invited back next year to share in this wonderful experience."

Carl McNealy
CRCM Mentor

GENERAL PROGRAM DATA

Number of Level I Students	2525
Number of Level II Students	30,216
Number of Elementary Schools	182
Number of Middle Schools	23
Number of High Schools	31
Number of School Districts	56
Number of Community-Based Organizations Involved	26
Number of Industries Involved	44
Total Number of Precollege Students	32,741
Total Number of Program Activities during the Year	317
Number of Ongoing Activities	155
Number of One-Day Activities	68
Number of Periodic Activities	37
Other Program Activities	57

EXEMPLARY PROJECT STRATEGIC PLAN AND OUTCOMES

Algebra Readiness Activities

The Algebra Readiness Activities are based on the premise that all students can understand and learn algebra. In order for this to occur, students must be actively involved in their learning, and the instruction must address mul-

tiple learning styles that lead to effective learning.

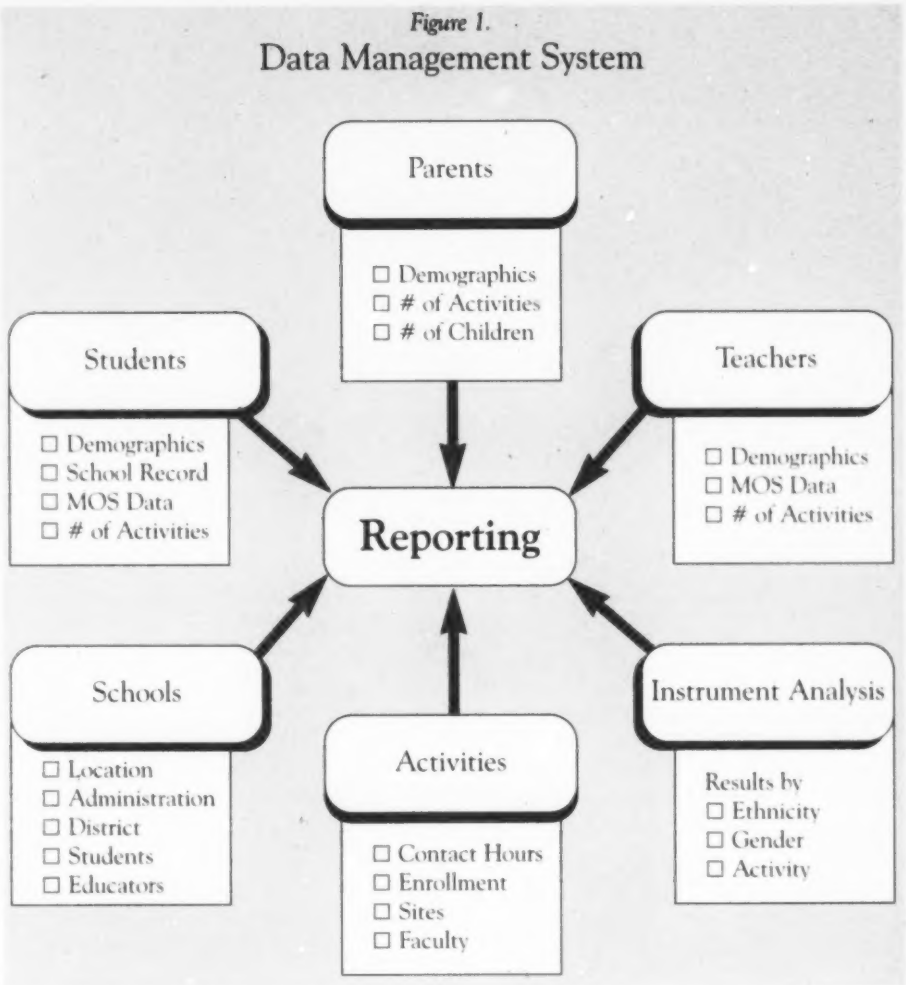
Students gain basic understanding of algebra using concrete materials where they can see, touch, and move around an x and an x^2. Once students have some basic understanding, they are encouraged to investigate, discover, and look for patterns. This leads to students' developing their rules for algebra, rules which are based on conceptual understanding of algebraic processes and are developed from multiple approaches.

Students participating in these activities develop self-steem and confidence and increase their ability to reason and communicate in mathematics. They transfer these higher-order thinking skills to other courses and use them in all areas of their lives.

Teachers participating in these activities learn to implement instructional and assessment techniques that lead to success for all students. They adopt these techniques to all their teaching and share them with their colleagues, thus enabling systemic change.

The Algebra Readiness Activities include En Algebra Club and PreAlgebra Academy for students; En Algebra Club, PreAlgebra Academy, Conceptual Algebra, and Hands-On Math Institute for teacher training. A total of 1405 students and 125 teachers participated in these activities during 1992–93. These activities occurred at 35 schools. Student contact hours totaled 58,869, and the number of teacher training contact hours was 3486. The posttest mean score was significantly higher than the pretest mean score (pretest mean = 10.13; posttest mean = 60.81), and 96 percent of the students reported that the information will help them in school. Eighty percent of all the seventh- and eighth-grade students who participated in at least 12 hours of Algebra Readiness activities during 1992–1993 have enrolled in Algebra I for the 1993–1994 academic year.

Figure 1.



Thus, the basic principles of the Algebra Readiness program can be summarized as follows:

- Promote active learning
- Develop conceptual understanding of processes
- Incorporate concrete to abstract methodology
- Encourage multiple approaches to solutions
- Address multiple learning styles
- Build self-esteem
- Make attainable for all

SYSTEMIC CHANGE

- Conceptual Algebra adopted as an in-class activity for seventh and eighth grade; change to complete hands-on science; use of math manipulatives at other grades.
  — 1 school district
- Changes to include use of hands-on science kits.
  — 8 school districts
- Changes in curriculum to include Conceptual Algebra or hands-on mathematics.
  — 1 school district
  — 10 schools in 5 districts
- Changed algebra sequence.
  — 2 school districts
- Interest in changing mathematics curriculum to include hands-on methodologies.
  — 1 school district
  — 12 schools in 7 districts
- Investigations to change science program.
  — 2 school districts
  — 6 schools in 5 districts

THE UNIVERSITY OF TEXAS AT SAN ANTONIO COMPREHENSIVE REGIONAL CENTER FOR MINORITIES

(established 1990)

INSTITUTION
UNIVERSITY OF TEXAS AT SAN ANTONIO (UTSA)
SAN ANTONIO, TEXAS

PRINCIPAL INVESTIGATOR
RAY GARZA

PROGRAM DIRECTOR
GILBERTO RAMON

PROJECT SUMMARY

The goals of the CRCM are (1) to double the number of minority high school graduates from CRCM high schools who are interested in SEM careers and proficient to pursue these studies; and (2) to help schools implement systemic change to enhance the quality and quantity of SEM teaching/learning available to minority students. These goals are pursued by targeting the K–12 pipeline in school systems. The CRCM strategy is to help schools maintain effective science and mathematics instruction and focus on the needs of students along critical educational transitional points. Teacher professional development activities target elementary, middle, and high school teachers and stimulate interest, increase confidence, and enhance abilities in math and science instruction. Student activities motivate, encourage, develop, and prepare minority students for science, engineering, and mathematics careers. Major activities and programs include Science Academies, Teacher Summer Institutes, Summer Laboratory and Academic Experiences, Curriculum Workshops, and Parent Outreach efforts.

Table 1.

Systemic Change and Impact

Event	*Impact*
• Brownsville ISD invests $1.5 Million for Fiscal Years 1992-93 to implement Saturday Academies, Algebridge, Tutorials and other science and mathematics activities.	36,000 Students
• Southwest Research Institute establishes Minority Scholars Employment Program (MSEP) as part of Home Grown Minority Development effort.	8 high school seniors in first year; ten added every year
• NCTM standards applied in 26 elementary and middle schools in two school districts; use of math manipulations adopted.	3,000 students
• Adams Elementary School implements Academic Year Science Activity based on CRCM Science Wonders Activity Model.	700 students
• El Jardin Elementary, a Governor's Partnership school, adopts CRCM Science Wonders Curriculum in New Schools Thematic Approach.	1200 students
• Hidden Cove Elementary School constructs science wing and implements Student/Parent Activity based on CRCM Science Wonders Model.	400 students

The center collaborates with community-based organizations and others in the implementation of programs and activities. For example, through the cooperation of the University Outreach Center, the Algebra Bridge Summer Program was implemented for eighth-grade students. The CRCM also worked with Texas Project 2061 to initiate a series of teacher professional development workshops in the physical sciences. The CRCM assisted the Southwest Research Institute in implementing a summer internship program, the Minority Scholars Employment Program, which targets Bexar County minority honors students.

In 1992–93, the CRCM coordinated 31 teacher and student activities involving 72 schools, 8 community-based organizations, 11 colleges and universities, 6 private corporations, and 3 state programs. These programs involved approximately 250 teachers, 1450 students, and 400 parents/family members.

PROJECT TESTIMONIALS

"The CRCM has taken a lead in developing projects which expand career access in science, mathematics, and engineering for

minorities ... One particular project that has received recognition because of its immediate impact is the Algebra Project. The Algebra Project has already resulted in a positive change in both teachers' and students' attitudes toward mathematics, better instruction of the students in these teachers' classes, and better preparation of the students to take algebra and higher mathematics ... We are particularly proud of the fact that the Algebra Project has been selected for the Governor's Office "Best of Texas" Program — a program ... featuring outstanding projects in four Texas cities. This would not have been possible without the support of the CRCM."

Dr. Dolores Munoz
Superintendent, Edgewood
Independent School District

"Southwest Independent School District continues to nourish and grow academically through the efforts of the CRCM. Through their support and aid, our elementary schools have the privilege of offering after-school academic science programs for the first time."

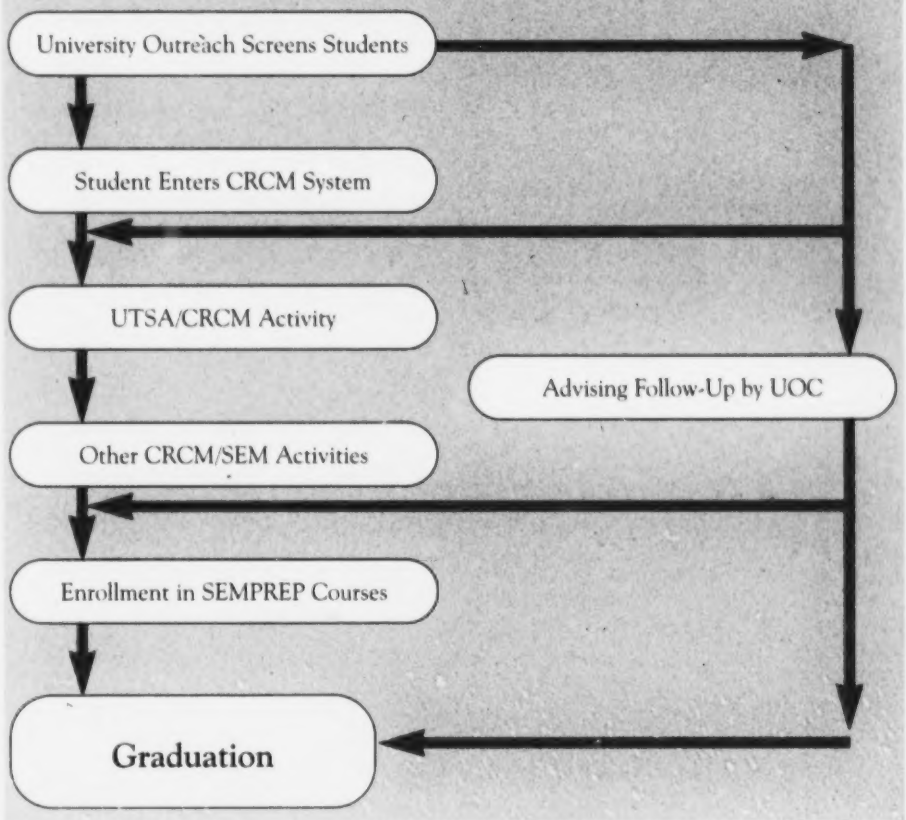
Mr. Richard Clifford
Superintendent, Southwest
Independent School District

"The CRCM is a leader on effective, innovative programs designed to promote and expand career access in science, mathematics, engineering, and technology for all students, particularly for those from traditionally underrepresented populations. Participation by our teachers, students, and parents in the CRCM programs creates a positive impact on learning, motivating students to take responsibility for their math/science learning, and promoting mathematics and science literacy. These programs evoke minority students interest in science and engineering careers and are a model for helping resolve our forecasted shortage of scientists and engineers."

Dr. Raymond L. Vick
Superintendent, Harlandale
Independent School District

Figure 1.

UTSA CRCM University Outreach Student Participation Monitoring



"Saturday Science Academy provides our teachers with an opportunity to extend their daily lessons and activities through hands-on experiences. Through this program, students and their parents work and learn together as a team. For the parents, teachers, and students, the experience is a rewarding one because the three hours that they spend on Saturday morning can best be summed up as "quality time" together. The program further enriches our students by providing them with challenging learning experiences where they investigate and discover the world around them through science."

Quinn, Principal
Hidden Cove Elementary School

GENERAL PROGRAM DATA

Number of Level I Students	1450
Number of Level II Students	5600
Number of Elementary Schools	47
Number of Middle Schools	10
Number of High Schools	15
Number of School Districts	5
Number of Community-Based Organizations Involved	6
Number of Industries Involved	6
Total Number of Precollege Students	1450
Total Number of Program Activities during the Year	31
Number of Ongoing Activities	28
Number of One-Day Activities	5
Number of Periodic Activities	8*

* Numbers include ongoing events

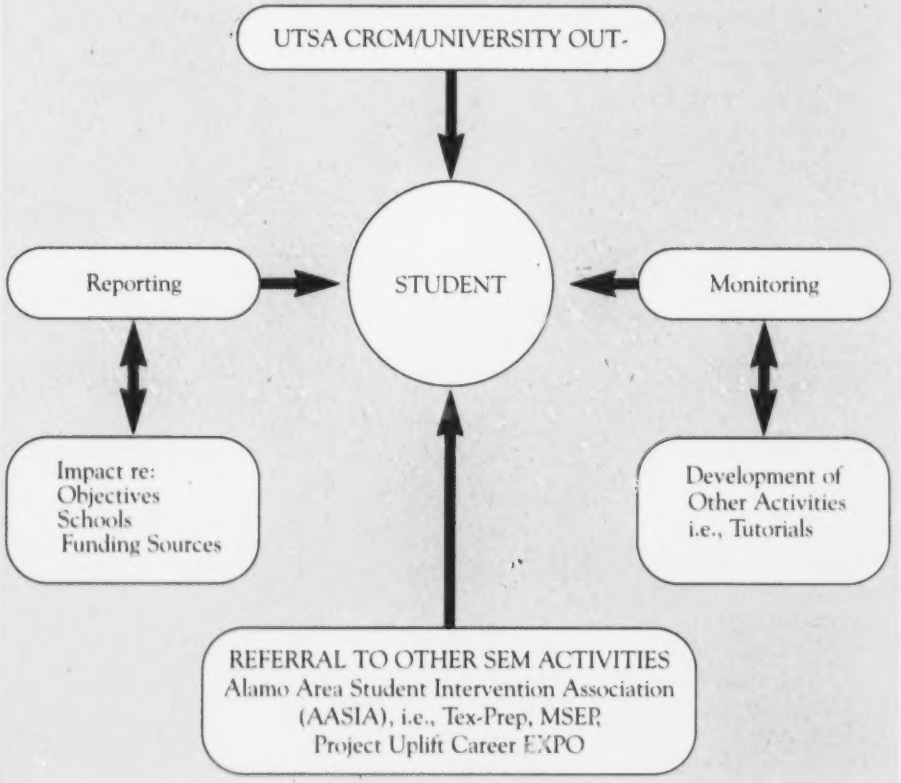
EXEMPLARY PROJECT STRATEGIC PLAN AND OUTCOMES

The UTSA CRCM strategic plan is based upon the belief that, for the educational system to encourage and enable Latino students to enter careers in science, mathematics, and engineering, direct intervention and systemic change are required in these specific areas:

1. Create expectations for Latino students to aspire to attend and succeed in college.
2. Provide support services that disseminate the necessary information, advice, and encouragement to enable Latino students to successfully negotiate the transition points in the education system, such as enrolling in Algebra I at the ninth-grade level.
3. Improve teacher knowledge and teaching skills in mathematics and the sciences.
4. Improve course content, including course curricula and curriculum materials, to enable students to learn the mathematical and scientific skills and concepts necessary to compete and achieve in college SEM degree programs.

Figure 2.

UTSA/CRCM University Outreach Student Participation Monitoring



The mission of the San Antonio CRCM is to facilitate systemic change in the participating school districts resulting in a substantial increase in the number of minority students enrolling in and completing math and science high school courses, and enrolling in and completing math, engineering, science, and technology degree programs in college. Six broad goals have been identified which correlate with the CRCM Program Outcome Measures and the CRCM Program Impact Measures to be used in the annual evaluation of the CRCM supported activities.

1. Increase the number of students participating in CRCM programs by 1000 by 1995.
2. Increase the number of CRCM participants participating in science fairs by 25 percent by 1995.
3. Double the number of minority students at CRCM schools enrolling in PreAlgebra and Algebra I by 1995.
4. Double the number of minority students at CRCM schools enrolling in MOS-designated science courses by 1995.
5. Increase the number of CRCM participant high school graduates enrolling in college as SEM majors to 350 by 1995.
6. Double the number of minority students at CRCM schools involved in SEM activities (school-related and extracurricular), i.e., science fairs, PREP by 1995.

The larger goal of the San Antonio CRCM is to have its activities and approaches become a model for school districts that wish to encourage minority students to achieve academically in mathematics and the sciences.

THE UTSA CRCM DATABASE SYSTEM

The UTSA CRCM sponsors a variety of student, teacher, and community programs that require the use of a relational database management system to facilitate the identification, internal monitoring, and tracking of program participants. San Antonio decided to use Paradox, a powerful and flexible data management system. Paradox is a PC-based program that allows the collection, sorting, and retrieval of information on a computer and generates reports that consolidate or summarize any or all of this information in nearly any order or format that is chosen. Even the creation of representations of numeric data by using color graphics is possible.

The heart of Paradox is the method the program uses to ask questions of the data. This method is Query By Example (QBE). One first types into a list, a table, the information to be saved. Then one uses QBE to get at the data when needed. Query By Example does not require one to memorize any syntax and is so forgiving that one does not even have to know exactly how to spell the information he or she is trying to retrieve. QBE is the key to the simplicity and power of Paradox. For example, one can use QBE to find the GPA of Joanne Smythe from a table of thousands of students, even if one thinks her name is Joan Smith.

Paradox also has the capability to access data stored on Structured Query Language (SQL; pronounced sequel) database servers. The program can act as an SQL front end that enables use of Paradox queries against an SQL database server (IBM O/S2, Oracle, etc.).

At present, this multiuser system is operating on a Novell network with 10 to 15 users sharing four laser printers and other peripherals. This allows access of data by program coordinators and data entry personnel, as well as program directors. A number of users may access any of the databases (student, teacher, program, etc.) simultaneously.

The system provides detailed coverage and statistics for four main "linked" data set(s):

- Student participants
- Teacher participants
- Programs
- Other participants, facilitators and/or community members

The database is used in (1) the tracking of students and teachers in the CRCM activities; (2) monitoring relationships between students and teachers; (3) providing data to support evaluation of center programs; (4) documenting student contact; (5) documenting college enrollment with majors; and (6) identifying effective models for increasing flow of students through various SEM programs.

The program is menu driven and facilitated by popup menus, lookup tables or subfiles, on-line help screens, validity checking, and the ability to create multitable forms and reports (i.e., production of various student data forms for K–5, junior high, high school, etc., which aids in data entry).

The systems' reporting capabilities are extensive and capable of generating

- demographic analysis (i.e., program activity, grade level, GPA, etc.).
- quantitative database elements.
- graphing capabilities.
- productions of mailouts (interfacing with WordPerfect).
- various reports required by funding sources.

REPORTING

Students involved in these activities complete a CRCM data form. They are entered into the CRCM database upon beginning an activity. Subsequent course enrollment information, grade completion information, and updated demographic data are acquired from the University Outreach by their own reporting system. This is done at the end of each academic year.

MONITORING

Review of data is discussed by both directors to assess difficulties and determine additional support/follow-up activities in science and mathematics. As an example, this has led to the development of a critical thinking skills activity to complement the tutorials currently in place.

REFERRAL

The data system is also utilized to inform students of additional CRCM activities and/or other area SEM activities. As an example, in partnership with Project Uplift, a New Mexico-based organization, the CRCM coordinates a two-day Science, Engineering, and Technology Career Expo in San Antonio, Texas. Information is disseminated to CRCM students by mail and through University Outreach counselors. Likewise, information and applications are also disseminated through the University Outreach counselors for Tex Prep, an intensive summer mathematics program.

THE EL PASO COMPREHENSIVE REGIONAL CENTER FOR MINORITIES

(established 1989)

INSTITUTION
UNIVERSITY OF TEXAS AT EL PASO
EL PASO, TEXAS

PRINCIPAL INVESTIGATOR
STEPHEN RITER

ASSOCIATE PROJECT DIRECTOR
R. LETICIA DÍAZ-RÍOS

PROJECT SUMMARY

Having completed its fourth year of operation, the El Paso CRCM at the University of Texas at El Paso continues to fill a regional need for precollege student activities in mathematics and science by implementing a sequential series of co-curricular and enrichment programs in El Paso elementary and secondary schools. These programs are expressly designed to have demonstrable impact on students' decision-making skills at all points in the pipeline. Programs such as the Science Day Camps, Summer Institutes in Science and Engineering, Project LIFT-OFF, the High School Transition Program, and the Summer Engineering Enrichment Experience highlight these efforts. During the 1992–1993 academic year, over 2300 Level 1 students participated in these programs.

At the same time, the El Paso CRCM's partnership with the El Paso Collaborative for Academic Excellence (EPC) ties its efforts to a much broader agenda for school reform in the city. Aimed at ensuring academic success for all young people in El Paso County, the EPC assists schools and postsecondary institutions in implementing improvement strategies at each site and upgrading the knowledge and skills of staff, especially faculty and administrators. The EPC provides training, assessment, and planning opportunities for school, district, college, and university improvement teams; brings together the latest and best information, from research and practice, about processes and mechanisms associated with student academic success; and provides on-site experienced assistance to schools and districts as they plan and implement a change process. During the past year, the EPC sponsored 15 programs, including the establishment of a Mathematics Institute, that have served over 73 schools composed of designated elementary, middle, and high school clusters. Over 700 teachers, counselors, administrators, and parents have participated thus far, and more schools are being brought into the effort each year. These comprehensive school trainings have had an impact on instructional practices immediately affecting approximately 14,000 Level II students in grades K–12, with the potential for affecting 70,000 K–12 students in El Paso County.

Outcomes of these combined efforts have been fruitful. Major redirection in policy and practice indicate that real change is happening.

- One of the three major school districts in El Paso eliminated all remedial math courses from its high school curricula and required that all freshmen take Algebra I. For the entire area this has represented a 26-percent increase in the total number of ninth graders taking Algebra I. Better still, 10 percent more students passed Algebra I in ninth grade this past year. Thus, we are passing nearly half of those students who would have previously not taken algebra in the ninth grade.
- One of the three major school districts in El Paso is requiring four years of mathematics and four years of science for high school graduation.
- CRCM Level 1 program participants complete MOS high school curricula at rates two, three, and even four times the completion rate for students in general.
- Level 1 CRCM high school graduates consistently fare better than high school graduates in general. This past year, while 27 percent of area graduates were sufficiently proficient to pursue postsecondary studies in mathematics, science, or engineering, 75 percent of CRCM high school graduates were MSE college-ready.

The CRCM's formation of a citywide education research and evaluation advisory group represents a unique approach to dealing with the challenges confronting issues related to school districts' accounting for student academic attainment. Immediate plans and issues regarding the assessment process are related to adapting and blending the different data gathering and reporting infrastructures in the all institutions involved in this endeavor to enhance data reporting and how best to work with schools on the use of data as a problem-solving tool to supplement or complement the work of the Texas Education Agency. Beyond these, a broad conceptual framework is being developed that ties more comprehensively the broader objectives of whole school improvement to CRCM/EPC objectives. These objectives focus on student performance, but they also include teacher knowledge and skills as well as the "restructuring process" in the schools.

The center and its collaborators have made a substantial amount of in-kind contributions, and very nearly a 1:1 match of NSF funds. Other contributions include use of facilities, technical and administrative assistance, public relations, and person hours from volunteer community mentors for various programs.

Finally, the value of testing various program strategies and evaluating their effectiveness is in CRCM/EPC's ability to disseminate information about its efforts and assist other public/private entities in implementing similar interventions. We have, therefore, embarked on a campaign to distribute information about the program and program outcomes to the local stakeholders through scheduled meetings, forums, and printed literature. A wider audience, outside the immediate area, has been informed through conference presentations and through our affiliation with broad network of discipline and minority education organizations.

PROJECT TESTIMONIALS

"I think CRCM's Project LIFT-OFF helps me in school by giving me an advantage over everyone else. It is a worthwhile opportunity for any student my age. Just to experience it makes me feel a whole lot better about myself."

Mayanin Alvarez
Project LIFT-OFF Student

"I think that the CRCM Bridge Program is just as the word says, a bridge between you and your future."

Noel Caballero
Summer Bridge Program Student

"As a mentor, I can make a difference with these students when it comes to their exploration of the sciences—through giving them the opportunity to get their hands on the sciences—to take it out of the book form into a three dimensional 'touch — feel — question' environment."

Skip Clark
Mentor, CRCM Project LIFT-OFF

"CRCM's Project LIFT-OFF can show these students how mathematics and science are applied—it is not just something in a textbook—it is not an isolated problem. They actually go out there and put it together and solve a problem. The critical thinking skills are there, but they actually are applying it without completely realizing they are doing the mathematics—they are doing the science. It is marvelous to open up their minds and take them beyond where they are—to show them things they might have never seen."

Joyce Gawell
Teacher, Project LIFT-OFF

GENERAL PROGRAM DATA

Number of Level I Students	2045
Number of Level II Students	3180
Number of Elementary Schools	66
Number of Middle Schools	34
Number of High Schools	24
Number of School Districts	3
Number of Community-Based Organizations Involved	11
Number of Industries Involved	33
Total Number of Precollege Students	5225
Total Number of Program Activities during the Year	90
Number of Ongoing Activities	66
Number of One-Day Activities	0
Number of Periodic Activities	0
Number of Other Activities	24

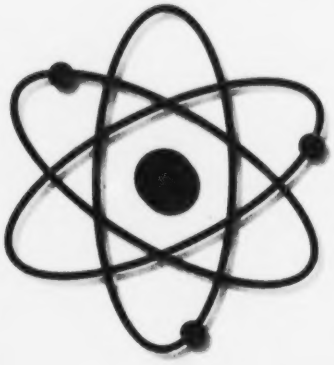
STRATEGIC PLAN

The primary strategies of El Paso CRCM are (a) to excite and nurture the interests of a broad spectrum of minority students in careers in science, mathematics, and engineering; and (b) to develop and strengthen the capacity of local schools to prepare students for college-level math, science, and engineering educations.

The El Paso CRCM at the University of Texas at El Paso has filled a regional need for precollege student activities in math and science for nearly five years by implementing a sequential collection of co-curricular and enrichment programs in El Paso

elementary and secondary schools. Programs such as the Science Day Camps, Summer Institutes in Science and Engineering, Project LIFT-OFF, the High School Transition Program, and the Summer Engineering Enrichment Experience highlight these efforts.

During 1992–1993, over 2000 students participated in 90 program activities. Among those student participants in high school, 65 percent and 31 percent matriculated in grade-appropriate science and mathematics courses, respectively. Still another 15 percent were in advanced placement science, while 65 percent were in advanced placement mathematics courses. Over



50 percent of students in COSMOS, a science/ technology magnet program, are CRCM participants, as are 10 percent of students in a new medical/health careers magnet program.

One hundred percent of high school students participating in high school to college transition programs enrolled at either a two-year or a four-year institution, and over 70 percent witnessed a real increase between preassessments and postassessments of their math competencies on their college math placement exam.

Elementary school district personnel reported improved grades in math and science, increased interest in studying math and science, improved overall achievement, enhanced self-image, and continued high rates of participation in school and district science fairs (up 35–50 percent from base year) among CRCM program participants.

EXEMPLARY PROJECT

Project LIFT-OFF

Project LIFT-OFF identifies middle school students (grade eight) with the potential to succeed in mathematics, science, and/or engineering, who otherwise might have been overlooked. It involves these students in a series of ongoing activities designed to enhance their experiences in math and science, with the intent of influencing course enrollment, understanding of science concepts, inquiry strategies, willingness to learn and perform, as well as educational and career planning. During each of the five years a student participates (grades 8 through 12), a mentoring program involving area professionals helps the students to continue their development of talents and explorations of educational and career opportunities.

There are five major activities in Project LIFT-OFF:

- **Student Selection.** Students are selected based on a combination of ability and motivational characteristics. The goal is to identify 50 students from each of the three major school districts in the El Paso area, evenly split on gender, and representing a broad spectrum of racial and ethnic (underrepresented) minorities. The current selection process favors teacher nomination, student request, and final selection based on a written essay.

- **The One Week Summer Kickoff.** Each school district conducts a one-week kickoff for the new cohort of students. The kickoff is located primarily on distant campus sites with some field trips. Activities include participation in hands-on experiences in chemistry, mathematics, physics, environmental studies, biology, engineering, and other sciences, varying with the campus facilities and personnel.

- **White Sands Missile Testing Site.** Conducted by program mentors who work at this government facility for first-year Project LIFT-OFF participants (i.e., eighth graders), this annual spring excursion involves a tour of the White Sands testing facility, presentations by White Sands staff, and discussions about how scientists work. Meetings with mentors are interwoven throughout the day. Students see and hear about test chambers for extrapolating the long-term effects of conditions like salt, fog, humidity, and extremes of temperature. They observe simulations of radar tracking systems, laser systems for identification of explosives, and other operating systems.

- **Periodic Reunions or Synergizers.** Each district holds a minimum of two meetings per year for those students in their first year of the program, as well as at least two activities for students who are in the second, third, or fourth year of the program. Additionally, CRCM sponsors at least one activity on the UTEP campus and/or an industry field-trip for first-year and continuing students, respectively. During a sixth year, these activities would be available to all five of the program's student cohorts. The intent of these programs is to bring together parents, students, mentors, and teachers in a social context with an "engineering problem" and to discuss information that may be of particular interest or importance to the student at that point in time of their high school career.

- **Mentoring and Research Internships.** Throughout their years of participation in Project LIFT-OFF, students have the opportunity to benefit from the program's mentoring activities. Professional scientists and engi-

neers from the local industrial and academic communities, serve as informal guides to these young people as they progress through high school. Mentors interact with their proteges in a number of different ways, including, for example, during activities conducted by the CRCM; taking students to the mentor's workplace; assisting the student with their science fair project; attending activities at the university or in the community that support the student's interest in mathematics, science, and/or engineering; and generally serving as a friend and confidante as they navigate the social and academic pressures of adolescence.

During this coming summer, student participants who are rising from grade 11 to grade 12 will also have the opportunity to work for two months with an academic or industry researcher in a laboratory setting. University and community college faculty, as well as community professionals, have responded positively to the CRCM's request, and we are anticipating placing 45 students in positions with stipends this summer. This activity would be continued during a sixth year.

Project LIFT-OFF has been operating for four years and currently has nearly 500 8th-, 9th-, 10th-, and 11th-grade student participants. In the fall of 1994, the program will have a full complement of students ranging from grade 8 through grade 12 and will support activities for nearly 650 participants.

Project LIFT-OFF is longitudinal in its design. It identifies students at a critical juncture in their academic careers and provides for ongoing support and enrichment activities that pique and sustain their interests in mathematics, science, and engineering throughout the high school years. It also provides essential information and strong encouragement for course-taking patterns that prepare these students for the rigors of postsecondary education in general, and for study in mathematics, science, or engineering education in particular. It is important, then, to distinguish this program from "event-driven" activities conducted at a single prescribed or designated time of the year.

Furthermore, the El Paso Collaborative, together with the CRCM and other key stakeholders in the El Paso area, has developed an aggressive plan for undertaking dramatic reform and systemic change in El Paso's schools. This plan has been submitted to the National Science Foundation for funding under its Urban Systemic Initiative. Significantly, El Paso stakeholders envision

- All of the city's 125,000 K–12 students engaged in the study of challenging, rich, high-quality, and real world mathematics and science at every point in their schooling.
- A dramatic improvement in student achievement levels in mathematics and science, significantly upgrading student skills and competencies, and preparing all students for the 21st century.
- A radical reshaping of the ways in which educational institutions do business and interact with other institutions and the broader community to create a cooperative, unified system supporting all students toward high achievement.

El Paso also adopted a parallel set of goals.

- To improve the scientific and mathematical literacy of all students in the community.
- To provide to all students a high quality mathematics and science education that will permit them to participate fully in a technological society.
- To enable a significantly greater number of these students to pursue careers in mathematics, science, engineering, and technology.

The CRCM's linkage with the El Paso Collaborative for Academic Excellence has been key to developing and strengthening the capacity of local schools in mathematics and science. During 1992–1993, the Collaborative provided intensive training for school improvement teams from over 70 El Paso schools, helping them to organize and plan for change. The EPC also created a Principal's Seminar, whereby area principals come together monthly to discuss and learn about the special role of the principal in the school improvement process; established a Mathematics Institute to provide teachers and administrators from over 25 area schools an opportunity to learn the best mathematics curriculum and instructional practices; brought together educators from elementary and secondary schools, the Community College, and the University to begin to define standards for what students should know and be able to do in key subject-matter areas; and earned a designation as 1 of 10 Community Compacts for Student Success across the country supported by the Pew Charitable Trusts to plan and implement model education systemic reforms.

APPENDICES

APPENDIX
Eastern Conference Highlights

APPENDIX
Western Conference Highlights

SAMPLE MINIMUM OBLIGATORY SET (MOS)

DATABASE MONITORING SYSTEM

The databases were developed by the Task Force on Evaluation over a two-year period. The data catalog is included below. Each variable name is given followed by the data type (text or numeric) and an example of correct data.

Definitions

Task Force—Representatives from each of the CRCMs and representatives from the Directorate for Education and Human Resources.

Database Monitoring System — The system consists of three databases:

- Program Database — Contains information regarding programmatic variables for a Center. Each program can then be matched with students or teachers participating in that program.
- Teacher Database — Contains information regarding identification, demographics, academic profile, certification and participation in CRCM activities.
- Student Database — Contains information regarding identification, demographics, ethnicity, gender, disability, grade level information, science and math performance measures, career interest measures and participation in CRCM activities.

PROGRAM MOS

1. Center Code: text (2) (ex. "AA" or "AC")
2. CRCM Program Number: text (3) (ex. "027" or "123")
3. Program Title: text (80) (ex. "Math Intensive Summer Session — CSUF")
4. Primary Target Population: text (1) (ex. "P" or "T")

   Students, Parents, Both Students & Parents, Pre-Service Teachers, In-Service Teachers, Administrators & Teachers, Both Students & Teachers, Counselors
5. Student Activity Component Type: text (1) (ex. "A" or "E")

   Enrichment, Transition, Retention, Research, Subject Matter, Mentoring, Tutoring, Leadership
6. Student Activity Component Primary Provider: text (1) (ex. "A" or "F")

   Business and Industry (including government laboratories), Consultants, Post-Secondary Academic Institution (ex. faculty or facility), Graduate or Undergraduate Students, K–12 Teachers, K–12 Students, Parents, Informal Science Providers (ex. museums, botanical gardens, planetariums)
7. Teacher Activity Component Type: text (1) (ex. "P" or "S")

   Leadership, Curriculum Development, Instructional Methods, Improved Content Knowledge
8. Teacher Activity Component Primary Provider: text (1) (ex. "A" or "F")

   Business and Industry (including government laboratories), Consultants, Post-Secondary Academic Institution (ex. faculty or facility), Graduate or Undergraduate Students, K–12 Teachers, K–12 Students, Parents, Informal Science Providers (ex. museums, botanical gardens, planetariums)
9. Parent Activity Component Type: text (1) (ex. "X" or "Z")

   Counseling, Volunteer, Enrichment, Unknown, Not Applicable
10. Parent Activity Component Primary Provider: text (1) (ex. "A" or "F")

    Business and Industry (including government laboratories), Consultants, Post-Secondary Academic Institution (ex. faculty or facility), Graduate or Undergraduate Students, K–12 Teachers, K–12 Students, Parents, Informal Science Providers (ex. museums, botanical gardens, planetariums)
11. Program Delivery/Site: text (1) (ex. "A" or "B")

    In local school as part of regular classroom instruction, In local school — other, Commuter Program, Residential (dormitory), Business and Industry Site
12. Program Time Frame: text (1) (ex. "A" or "C")

    Academic Year, Summer, Academic Year and Summer

13. Non-NSF Contributions: numeric (7) (ex. 18400 or 1934560)

14. NSF Contributions: numeric (7) (ex. 18400 or 1934560)

Grades Served: text (1) (ex. "Y" or "N")

15. Grade K
16. Grade 1
17. Grade 2
18. Grade 3
19. Grade 4
20. Grade 5
21. Grade 6
22. Grade 7
23. Grade 8
24. Grade 9
25. Grade 10
26. Grade 11
27. Grade 12

Subject Matter Distribution: numeric (3) (ex. 100 or 5)

28. Biology %
29. Chemistry %
30. Earth Science %
31. Geology %
32. Physics %
33. Other Science % (not listed above)
34. Pre-Algebra %
35. Algebra I %
36. Algebra II %
37. Geometry %
38. Trigonometry %
39. Pre-Calculus/ Math Analysis %
40. Calculus %
41. Other Mathematics % (not listed above)
42. Computer Science %
43. Engineering %
44. Instructional Materials Development %
45. Other %
46. Total Contact Hours: numeric (4) (ex. 120 or 75)
47. Year of Record: text (4) (ex. "1989" or "1992")
48. Enrichment Program Classification: text (1) (ex. "A" or "K")

    Saturday Academy, Pre-High School Bridge Program, Pre-College Bridge Program, Summer Camp/Institute, Pre-Algebra Project, Middle School Algebra Project, Research and Mentorship Programs for Students; Science, Math or Engineering Club, Science Fair Project Church-Associated Enrichment Project, Teacher Resource Center Workshop/Seminar (students, teachers, parents), Math or Science

STUDENT MOS

1. Center Code: text (2) (ex. "AA" or "AC")
2. Social Security Number: text (11) (ex. "554-21-0216")
3. Birth Date: numeric (8) (ex. 19701005 or 19740418)
4. Ethnicity: text (1) (ex. "1" or "4")

   Black, Not of Hispanic Origin; Hispanic; White, Not of Hispanic Origin; American Indian or Alaskan Native; Asian; Pacific Islander

5. Gender: text (1) (ex. "M" or "F")

   Male, Female

6. Disabled: text (1) (ex. "Y" or "N")
7. Grade at First Entry into CRCM: text (2) (ex. "05" or "12")
8. Date Initiated into Tracking System: numeric (8) (ex. 19910828)
9. Type of School: text (1) (ex. "T" or "P")

   Public, Private, Magnet, Tribal, Bureau of Indian Affairs

10. CRCM Status: text (1) (ex. "1" or "2")

    In CRCM; Continuing in SEM Pipeline, not in CRCM; Out of SEM Pipeline

11. Date of CRCM Status: numeric (8) (ex. 19900929 or 19911023)
12. Exit Date: numeric (8) (ex. 19900929 or 19911023)
13. Exit Grade: text (2) (ex. "00" or "12")
14. Exit Reason: text (40) (ex. "Academic grades")
15. Reentry Code: numeric (1) (ex. 1 or 2)
16. Current Grade: text (2) (ex. "00" or "12")

Program Linkage

17. CRCM Program Number: text (3) (ex. "101" or "231")
18. Year of Record: text (4) (ex. "1990" or "1991")

Complete for Students in Grades 6 to 12 ONLY

19. Career Interests/Aspirations: text (1) (ex. "2" or "7")

    Medically related Biological Science, Nonmedically related Biological Science, Engineering, Computer Science, Physical Science, Mathematics, Experimental Social Science, Elementary Education, Other

20. Interested in Teaching: text (1) (ex. "1" or "3")

    Interested in teaching math/science; Interested in teaching — other; Not interested in teaching

21. Interested in Research: text (1) (ex. "Y" or "N")

22. GPA for Grade 9
23. GPA for Grade 10
24. GPA for Grade 11
25. GPA for Grade 12

Mathematics Courses

26. Pre-Algebra Grade Received: text (1)
27. Pre-Algebra Grade Level Taken: text (2)
28. Algebra I Grade Received: text (1)
29. Algebra I Grade Level Taken: text (2)
30. Algebra II Grade Received: text (1)
31. Algebra II Grade Level Taken: text (2)
32. Geometry Grade Received: text (1)
33. Geometry Grade Level Taken: text (2)
34. Trigonometry Grade Received: text (1)
35. Trigonometry Grade Level Taken: text (2)
36. Math Analysis Grade Received: text (1)
37. Math Analysis Grade Level Taken: text (2)
38. Probability/Statistics Grade Received: text (1)
39. Probability/Statistics Grade Level Taken: text (2)
40. Calculus Grade Received: text (1)
41. Calculus Grade Level Taken: text (2)
42. AP Calculus Grade Received: text (1)
43. AP Calculus Grade Level Taken: text (2)
44. Computer Science/ Technology Grade Received: text (1)

    (Computer Science/ Technology not to include word processing, spreadsheets, or databases)
45. Computer Science/ Technology Grade Level Taken: text (2)
46. AP Computer Science Grade Received: text (1)
47. AP Computer Science Grade Level Taken: text (2)

Science Courses

48. Life Science Grade Received: text (1)
49. Life Science Grade Level Taken: text (2)
50. Physical Science Grade Received: text (1)
51. Physical Science Grade Level Taken: text (2)
52. Biology Grade Received: text (1)
53. Biology Grade Level Taken: text (2)
54. AP Biology Grade Received: text (1)
55. AP Biology Grade Level Taken: text (2)
56. Chemistry Grade Received: text (1)
57. Chemistry Grade Level Taken: text (2)
58. AP Chemistry Grade Received: text (1)
59. AP Chemistry Grade Level Taken: text (2)
60. Physics Grade Received: text (1)
61. Physics Grade Level Taken: text (2)
62. AP Physics Grade Received: text (1)
63. AP Physics Grade Level Taken: text (2)
64. Year of High School Graduation: text (4) (ex. "1989" or "1991")

National Test Scores

65. ACT English Score — Set 1: numeric (2) (ex. 8 or 26)
66. ACT Mathematics Score — Set 1: numeric (2) (ex. 8 or 26)
67. ACT Reading Score — Set 1: numeric (2) (ex. 8 or 26)
68. ACT Science Reasoning Score — Set 1: numeric (2) (ex. 8 or 26)
69. ACT Composite Score — Set 1: numeric (2) (ex. 8 or 26)
70. Grade Level Taken: text (2) (ex. "09" or "12")
71. ACT English Score — Set 2: numeric (2) (ex. 8 or 26)
72. ACT Mathematics Score — Set 2: numeric (2) (ex. 8 or 26)
73. ACT Reading Score — Set 2: numeric (2) (ex. 8 or 26)
74. ACT Science Reasoning Score — Set 2: numeric (2) (ex. 8 or 26)
75. ACT Composite Score — Set 2: numeric (2) (ex. 8 or 26)
76. Grade Level Taken: text (2) (ex. "09" or "12")
77. PSAT Verbal — Set 1: numeric (2) (ex. 8 or 75)
78. PSAT Math — Set 1: numeric (2) (ex. 8 or 75)
79. Grade Level Taken: text (2) (ex. "09" or "12")
80. PSAT Verbal — Set 2: numeric (2) (ex. 8 or 75)
81. PSAT Math — Set 2: numeric (2) (ex. 8 or 75)
82. Grade Level Taken: text (2) (ex. "09" or "12")
83. SAT Verbal — Set 1: numeric (3) (ex. 88 or 570)
84. SAT Math — Set 1: numeric (3) (ex. 88 or 570)
85. Grade Level Taken: text (2) (ex. "09" or "12")

86. SAT Verbal — Set 2: numeric (3) (ex. 88 or 570)

87. SAT Math — Set 2: numeric (3) (ex. 88 or 570)

88. Grade Level Taken: text (2) (ex. "09" or "12")

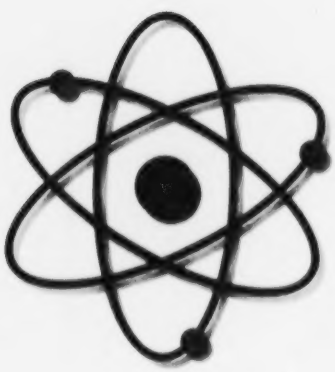
Post-High-School Enrollment/Undergraduate

89. College Enrollment — 2 year: text (1) (ex. "Y" or "N")

90. College Enrollment — 4 year: text (1) (ex. "Y" or "N")

91. Major: text (1) (ex. "2" or "7")

    Medically related Biological Science, Nonmedically related Biological Science, Engineering, Computer Science, Physical Science, Mathematics, Experimental Social Science, Elementary Education, Other



TEACHER MOS

Include in the Teacher MOS only teachers in the targeted schools who have received in-service or curriculum development instruction.

1. Center Code: text (2) (ex. "AA" or "AC")

2. Social Security Number: text (11) (ex. "554210216")

3. Ethnicity: text (1) (ex. "1" or "4")

    Black, Not of Hispanic Origin; Hispanic; White, Not of Hispanic Origin; American Indian or Alaskan Native; Asian; Pacific Islander

4. Gender: text (1) (ex. "M" or "F")

    Male, Female

Academic Profile

5. Highest Degree Attained: text (1) (ex. "1" or "5")

    Bachelors, Masters, Education Specialist/ Advanced Certificate, EdD, PhD, Other

6. Major: text (1) (ex. "3" or "8")

    Medically related Biological Science, Nonmedically related Biological Science, Engineering, Computer Science, Physical Science, Mathematics, Experimental Social Science, Elementary Education, Other

7. Academic Level Taught: text (1) (ex. "E" or "H")

    Elementary, High School, Middle School (also Intermediate and Junior High Schools)

8. Certified in Math/Science: text (1) (ex. "Y" or "N")

9. Teaching in Certified Area: text (1) (ex. "Y" or "N")

Program Linkage

10. CRCM Program Number: text (3) (ex. "101" or "231")

11. Year of Record: text (4) (ex. "1989" or "1991")

Subject Matters Taught: text (1) (ex. "Y" or "N")

12. Biology

13. Chemistry

14. Earth Science

15. Geology

16. Physics

17. Other Science (not listed above)

18. Pre-Algebra

19. Algebra I

20. Algebra II

21. Geometry

22. Trigonometry

23. Pre-Calculus/Math-Analysis

24. Calculus

25. Other Mathematics (not listed above)

26. Computer Science

27. Other Subject Matter Taught: text (20) (ex. "Pre-Engineering")

STIS

The Science & Technology Information System (STIS) at the National Science Foundation

What is STIS?

STIS is an electronic dissemination system that provides fast, easy access to National Science Foundation (NSF) publications. There is no cost to you except for possible long-distance phone charges. The service is available 24 hours a day, except for brief weekly maintenance periods.

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- General publications and reports
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- NSF organizational and alphabetical phone directories
- NSF vacancy announcements
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There are many ways to access STIS. Choose the method that meets your needs and the communication facilities you have available.

Electronic Documents Via E-Mail. If you have access to Internet e-mail, you can send a specially formatted message, and the document you request will be automatically returned to you via e-mail.

Anonymous FTP. Internet users who are familiar with this file transfer method can quickly and easily transfer STIS documents to their local system for browsing and printing.

On-Line STIS. If you have a VT100 emulator and an Internet connection or a modem, you can log on to the on-line system. The on-line system features full-text search and retrieval software to help you locate the documents and award abstracts that are of interest to you. Once you locate a document, you can browse through it on-line or download it using the Kermit protocol or request that it be mailed to you.

Direct E-Mail. You can request that STIS keep you informed, via e-mail, of all new documents on STIS. You can elect to get either a summary or the full text of new documents.

Internet Gopher and WAIS. If your campus has access to these Internet information resources, you can use your local client software to search and download NSF publications. If you have the capability, it is the easiest way to access STIS.

Getting Started with Documents Via E-Mail

Send a message to the Internet address **stisserv@nsf.gov**. The *text* of the message should be as follows (the Subject line is ignored):

get index

You will receive a list of all the documents on STIS and instructions for retrieving them. Please note that all requests for electronic documents should be sent to **stisserv**, as shown above. Requests for printed publications should be sent to **pubs@nsf.gov.**

Getting Started with Anonymous FTP

FTP to *stis.nsf.gov*. Enter *anonymous* for the username, and your E-mail address for the password. Retrieve the file "index". This contains a list of the files available on STIS and additional instructions.

Getting Started with The On-Line System

If you are on the Internet: *telnet stis.nsf.gov*. At the login prompt, enter *public*.

If you are dialing in with a modem: Choose 1200, 2400, or 9600 baud, 7-E-1. Dial (703) 306-0212 or (703) 306-0213

When connected, press *Enter*. At the login prompt, enter *public*.

Getting Started with Direct E-Mail

Send an E-mail message to the Internet address **stisserv@nsf.gov**. Put the following in the text:

get stisdirm

You will receive instructions for this service.

Getting Started with Gopher and WAIS

The NSF Gopher server is on port 70 of **stis.nsf.gov.** The WAIS server is also on **stis.nsf.gov.** You can get the ".src" file from the "Directory of Servers" at **quake.think.com.** For further information contact your local computer support organization.

For Additional Assistance Contact:

E-mail: *stis@nsf.gov* (Internet)

Phone: (703) 306-0214 (voice mail)

TDD: (703) 306-0090

NSF 94-4
(Replaces NSF 91-10)